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INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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STEELGUARD™

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STEELGUARD intumescent coatings enhance the fire resistance of structural materials by providing a layer of insulation, which is formed as a result of a chemical reaction initiated by fire.

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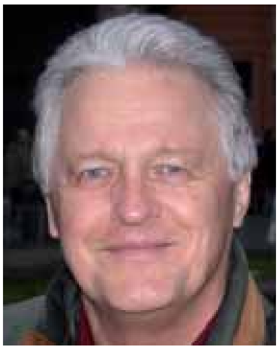

Graham Collins

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Déjà Vu

Once again a tragic nightclub fire where firefighting equipment did not work, where naked flames were allowed inside the crowded building, where the need for passive fire protection was ignored, where emergency signage was inadequate and where safe escape was either hindered or denied. I refer, of course, to the recent nightclub fire in Brazil that snuffed-out the lives of more than 230 youngsters enjoying a night out, literally decimating the 2000 believed to be in the club when the fire broke out.

Sad beyond measure though this is, what I find so infuriating is that it has happened before, far too many times.

A fire at The Station nightclub in Rhode Island in the USA in 2003 was one of the deadliest in the country's history. During a rock band performance, pyrotechnics set fire to flammable sound-proofing foam that lined the walls and ceiling, killing 100 and injuring 200. A year later a flare ignited ceiling foam at an over-crowded nightclub in Buenos Aires in Argentina, this time killing 194 people. Indoor fireworks were also blamed for a fire at a club in Bangkok on New Year's Eve 2008 in which 66 partygoers died. Another indoor fireworks display at a nightclub in Perm in Russia ignited a plastic ceiling decorated with branches, killing 152 people in December 2009.

So how are they allowed to happen?

From a brief review of these fires it is clear that we are not considering low-profile venues that could reasonable be missed by those responsible for enforcing safety standards. On the contrary, many are particularly well known locally. So, why do these devastating fires still occur?

Clearly, the owners and operators of these nightclubs must be held responsible as the safety of the customers clearly comes way down the priorities list, and so way after the desire to attract the largest number of customers and profit maximisation. But, the fact that they get away with this has to be down to a failure of enforcement. I have little doubt that, if nightclub owners and operators were threatened with imminent closure if they did not comply with the prevailing standards, safety would accelerate quickly up the priority list; the more so if spot checks were routinely conducted and if enforcement action or prosecution was swift and painfully decisive.

Overcrowding, locked exits, flammable construction materials and the frequent use of pyrotechnic displays or fireworks inside these buildings make nightclub fires, in the vast majority of cases, preventable catastrophes.

There are no prizes for spotting the common threads that run through all of these nightclub fires. Overcrowding, locked exits, flammable decorative and construction materials, make them, in the vast majority of cases, preventable catastrophes. The frequent use of pyrotechnic displays or fireworks inside these buildings – usually as part of live stage acts or bands – has been the cause of many of these tragic disasters.

Over the past few decades, these fires have occurred in a variety of countries including Argentina, China, France, the Philippines, Thailand, Russia and the USA. Significantly, many – although by no means all – of these countries fall into the "developed" category, where fire safety standards and codes are well established and where there are otherwise effective enforcement authorities.

Of course, enforcing authority resources are stretched in just about every country, but surely, with nightclub fires accounting for such large numbers of deaths – and undoubtedly an equally high number of those physically or psychologically injured people – they need to be treated as high-risk priority fire risks? If not, I have no doubt, based on recent figures, that we will have yet another déjà vu event in the not too distant future accompanied by another wholly avoidable catastrophic death toll. IFP

Gilt-Edged Protection

FIRETRACE INTERNATIONAL has supplied an automatic fire detection and suppression system to provide around-the-clock fire protection for a large transformer at the Kusasalethu mine on the Gauteng province/north-west border of South Africa. Among the latest mine-related orders to be announced by Firetrace International, this brings the tally of Firetrace systems installed in the past year or so at the Kusasalethu mine and the Evander mine, on the Kimberley Reef in the Evander Basin, to in excess of 50. Both mines are owned by Harmony Gold, one of the world's largest gold mining companies.

The Firetrace systems installed at Kusasalethu and Evander are being used to protect MCCs (Motor Control Centres) and essential electrical and machinery control enclosures in the sites' substations. The installation protecting the transformer at the Kusasalethu mine is a combination of a Firetrace ILP (Indirect Low Pressure) ABC dry powder installation with a watermist system. The majority of the other Firetrace systems installed have used both the Firetrace ILP system and the Firetrace DLP (Direct Low Pressure) system with 3M Novec 1230 Fire Suppression Fluid as the extinguishing agent.

Firetrace International points out that the difference between the ILP and DLP systems is, essentially, in the way in which the suppression agent is discharged. Both systems comprise a cylinder containing the suppression agent that is attached to specially developed leak-resistant polymer tubing. This proprietary Firetrace Detection Tubing is a flexible, linear pneumatic heat and flame detector that is routed throughout the enclosures being protected. Immediately a fire is detected the tubing ruptures at the point where the heat is detected, automatically triggering the release of the suppression agent, suppressing the fire in less than ten seconds.

For more information, go to www.firetrace.com

Black & White tape

FIREPROTECT (CHESTER) has added to its range of high temperature ceramic and intumescent tapes with the launching of a new black version of its glazing tape, called FCL black. The unveiling comes at a time when the company is celebrating 30 years in business and has re-branded its tapes to incorporate the FCL prefix.

The new black tape complements the FCL white glazing tape, which can sometimes be visible through the glass, to the aesthetic detriment of the installation. It is made from very high quality body soluble fibrous material, which uses long fibres with a low percentage of organic binders. It has excellent thermal insulation properties, is easily cut to size, withstands constant working temperatures of 1000°C and has a classification temperature of 1200°C. The tape is coated one side with a pressure-sensitive adhesive system, identical to FCL white tape and the FCL ceramic tape.

It is ideal for glazing in fire doors and curtain walling applications.

For more information, go to www.fireprotect.co.uk

Revised Door Standards

The LOSS PREVENTION CERTIFICATION BOARD (LPCB) has launched two revised door standards to help reinforce the message that doorsets, shutters and active smoke/fire barriers must be correctly maintained and installed in order to protect life, property and business.

The Board has updated LPS 1197 (Requirements for the LPCB Approval and Listing of Companies inspecting, repairing and maintaining fire and security doors, doorsets, shutters and active smoke/fire barriers) and LPS 1271 (Requirements for the LPCB Approval and Listing of Companies installing fire and security doors, doorsets, shutters and active smoke/fire barriers).

LPS 1197 now includes inspection of fire doors and shutters and also the maintenance of security doors and shutters. Both schemes now also require that the approved companies issue numbered LPCB Certificates of Conformity which certify that the works were carried out in accordance with the installation rules applied.

Companies that are approved to LPS 1197 and LPS 1271 and free download pdf versions of the standards are available at www.redbooklive.com

For more information, go to www.breglobal.com

Heathrow 'Pods' Protection

Heathrow Airport 'pods' – driverless vehicles that transfer passengers from two remote car park stations to the Terminal 5 station – are being protected by a linear heat detection system manufactured by PATOL. These 21 rechargeable-battery-powered pods provide low energy, zero emission vehicles that carry up to four passengers and their luggage along a dedicated 3.8 kilometre guideway.

The linear heat detecting cable is installed in the front and rear compartments of the pods – the rear housing the batteries and the front housing the motor and gearbox – to protect the batteries and provide early detection of overheating or fire. Each vehicle has a central processor and if the sensor is activated, the alarm signal will be reported to the central control room through the vehicle radio network.

The journey involves no driver and no airport personnel, with the passenger entering the pod and activating it simply by touching a computer screen to select their chosen destination. Passenger confidence is therefore paramount and safety a fundamental factor in the development of the technology. The pods are also monitored by CCTV, with a dedicated team of controllers available to assist at the touch of a button.

For more information, go to www.patol.co.uk

Suppression Solution is LABC Registered

The Automist pre-engineered watermist solution from PLUMIS has now been assessed and accepted as a Local Authority Building Control LABC Registered Solution to provide active protection for escape routes and facilitate open-plan layouts in suitable loft conversion applications.

LABC Registration allows a company to register a product so individual local authorities can automatically approve it. The scheme enables much faster approval of most open-plan layouts, allowing building control officers to approve loft conversion projects without a long and detailed investigation. It assures approvers that the system has been rigorously checked and independently peer reviewed. The scheme is designed to streamline the adoption of innovative solutions in appropriate applications.

For more information, go to www.plumis.co.uk

Sprinklers Earn CE Mark

TYCO FIRE PROTECTION PRODUCTS has announced what it is claiming to be the fire protection industry's first Early Suppression Fast Response (ESFR) sprinklers with a K-factor of 16.8 (242) and 25.2 (360) to earn the CE mark in the European Union.

The ESFR-17 pendent and upright sprinklers and the ESFR-25 pendent sprinkler are tested to the new product standard developed by FM Approvals in collaboration with the European Organization for Technical Approvals (EOTA). Endorsed by the EOTA, the standard is the result of demand from owners and installers throughout the EU to know which storage sprinklers meet the necessary standards.

For more information, go to www.tyco-fire.com

US Study Finds Risks In Building Insulation

Researchers in the United States are calling for a change to the US building codes, following a study showing that the mandatory flame retardants routinely added to foam insulation are not only harmful to human health and the environment, but also make no difference to the prevention of fire in buildings where a fire-safe thermal barrier already exists. Such a change would bring the US building codes in line with regulations in Sweden and Norway.

The research team, which is drawn from the University of California and the Lawrence Berkeley National Laboratory, conducted a thorough review of fire safety literature since the mid-1970s and conclude that the addition of halogenated organic compounds to plastic insulation materials such as polystyrene, polyisocyanurate and polyurethane is costly, ineffective and environmentally damaging.

Led by fire expert Dr Vytenis Babrauskas of Fire Science & Technology Inc., the research team investigated the impact of the "Steiner Tunnel test", which is used to test the propagation of fire over the surface of all sorts of building materials in the early stages of fire (before flashover point is reached).

Their paper suggests that changing the US building codes to exempt foam plastic insulation materials from the test would avoid the use of thousands of tonnes of flame retardants that are known or suspected to be persistent organic pollutants. They conclude: "Such a change would … decrease the cost of foam plastic insulation and encourage the use of insulation materials for increasing building energy efficiency and mitigating climate change. The potential for health and ecological harm from the use of flame retardant chemicals would be reduced and the fire safety of buildings would be maintained."

The experts suggest that exempting foam plastic insulation materials from the Steiner Tunnel test would mean there was no longer a need to add these flame retardants.

For more information, go to www.tandfonline.com

Products Achieve Safety Approval

Fifteen APOLLO products have been independently evaluated to IEC61508 resulting in Safety Integrity Level (SIL) 2. This evaluation establishes the functional safety of the products by illustrating how reliably and correctly they respond to inputs.

While on site testing and maintenance is a vital component of ensuring the on-going functionality of any fire detection system, it does not provide evidence that in a 'live' situation, equipment will function as planned. An SIL rating gives confidence that it will. Through a series of extensive evaluations this certificating process demonstrates a product's integrity to perform its primary function in a real life situation.

Evidence of this kind is particularly important in high risk environments, such as the marine and offshore industry, as well as other sectors including education and healthcare that demand a high level of functional safety.

For more information, go to www.apollo-fire.co.uk

Misting Portable

A new E-Series kite-marked fire extinguisher described by JEWEL FIRE SYSTEMS as "revolutionary" operates in the same way as other hand-held extinguishers, but uses patented technology that creates a superfine mist using nothing but purified water.

According to Jewel Fire Systems, the size of the ultra-fine particles means it is incredibly versatile and suitable for use against most types of fire, even on fuel fires and electrical risks. The E-Series extinguisher has also been given an F-Class rating, which certifies it is safe to use on fat fires commonly found in kitchens. The suppression agent causes no further residual or environmental damage to the surrounding areas, unlike powders or foams and is totally environmentally friendly.

The E-Series extinguisher is approved by the Loss Prevention Council (LPCB), and carries full AKAS product certification, as well as its recently obtained BSI kite mark. The UK Fire Association has also publicly endorsed the product.

For more information, go to www.jewelsaffire.co.uk

Reach for the Sky

VICTAULIC FireLock Style 009H couplings, fittings and sprinkler heads have been installed in all 51 above-ground floors and the three-floor underground basement parking area of the CB 31 or First Tower in the Défense business quarter of Paris – at 225 metres, the highest skyscraper in France today – as part of a major internal and external transformation of the building that including extending its height from 159 metres to 225 metres.

The CB 31 Tower houses 79,000 square metres of office space and posed the challenge of installing over 10,000 pipe joints in a fire protection system that had to account for building sway, creep and settlement. This meant that key considerations were how to carry out the installation quickly and safely, particularly in the tight spaces available. Most critical however was that the standard pressure rating of the products had to be at least 20 bar.

To achieve this, the Victaulic devices were delivered pre-assembled with couplings and valves already in position, so installers only needed to place them in the system and make some very minor adjustments. Designed to be the smallest footprint in the industry, the valve bodies make maintenance more convenient and, as there is no need to open the cover plate to reset the clapper, resetting is both more secure and simple. Fully rated and tested at 20 bar without the need for pressure-reducing valves, the Victaulic devices eliminated the air-to-water differential. This allows faster delivery of water to sprinklers and controls friction loss on high-rise installations, ensuring maximum efficiency within the fire protection systems as soon as they are installed.

For more information, go to www.victaulic.com

System Scores at Cricket Ground

APOLLO has supplied open protocol fire detection systems at the 23,000 capacity Kia Oval, Surrey County Cricket Club's ground in the UK – one of the most distinctive stands in international cricket.

The new fire detection systems have been installed in the Pavilion, Lock and Laker stands at the Pavilion End of the ground, which also houses the Kennington Club, committee rooms and museum. The installation consisted of a hybrid of Apollo's Discovery hard-wired and XPander radio ranges, working in conjunction with an Advanced control panel in each stand. With 20 zones for each stand, over 200 optical detectors were installed along with 30 call points and in excess of 30 loop interfaces/XPander radio devices.

The Pavilion End of the ground is an iconic part of the Kia Oval. Its rooms are packed with the sport and the club's history, so a wireless detector range was the obvious choice allowing the installation to be completed with minimum disruption to both the members and the interior's decoration. There are also a number of more functional areas in the Club, such as the kitchen and plant rooms, where the Apollo hard-wired system was installed.

For more information, go to www.apollo-fire.com

New Audio Signal Generator

C-TEC has launched the new FPROSG audio signal generator, specifically designed to simplify the testing of induction loop systems to current British Standards.

Factory calibrated to provide a fixed audio signal, the generator includes all of the test tones required to test audio frequency induction loop amplifiers to BS 7594 (1 kHz sine wave, frequency response and metal compensation), plus speech and music tracks to assist with subjective testing.

For more information, go to www.c-tec.co.uk

Ceiling-only Sprinkler

TYCO FIRE PROTECTION PRODUCTS has unveiled enhancements to the existing UL Listing of its ESFR-25 pendent sprinkler for storage applications with up to 14.6-metre ceiling height.

Features claimed for the ESFR-25 include higher ceiling-only protection, which eliminates the need for in-rack sprinklers for protection of Class I through cartoned unexpanded Group A plastics in various storage arrangements, and lower minimum operating pressure than other ceiling only alternatives.

For more information, go to www.tfppemea.com

Passive Protection Online Training

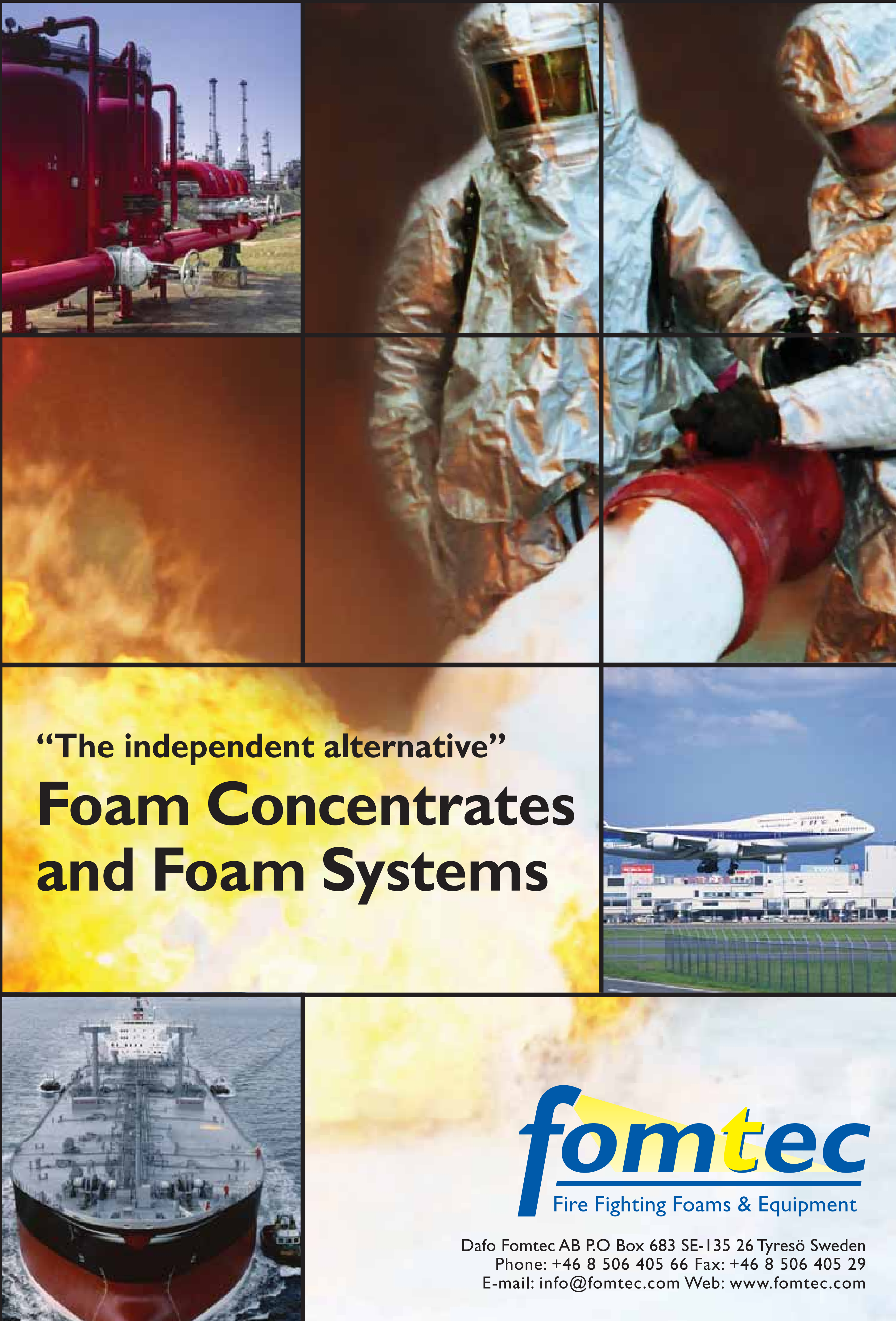
UNIFRAX has instigated a number of fire protection training courses for FyreWrap duct and plenum insulation that are now available free online.

The FyreWrap Duct & Plenum Insulation Installer Training Course is designed specifically to educate contractors regarding flexible duct and plenum wrap applications and the correct installation of the FyreWrap systems and attachment methods. Course certification as a "trained installer" is provided upon successful completion of the course.

An American Institute of Architects (AIA) accredited course is also available and designed specifically to educate architects, engineers, building owners, installers and code officials regarding flexible wrap applications and the benefits offered with this type of shaft alternative fire protection technology. Certificates of completion are provided as well as AIA Continuing Education Units credits if applicable.

Unifrax FyreWrap fire protection products offer a solution to a variety of passive fire protection applications where lightweight, thin materials are needed to prevent flame penetration and achieve a significant temperature drop. Materials are lightweight, easy to fabricate and capable of providing protection up to 1260°C.

For more information, go to www.unifrax.com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CPR: Take Steps Now to Avoid Confusion

Paul Duggan

Exova Warringtonfire

The Construction Products Regulation (CPR) was cited in the Official Journal in 2011 and all parts finally come into force on the 1st July 2013. However, it appears there are still missing gaps in the knowledge of the construction industry.

It seems there is a lot to achieve between now and 1st July when key parts of the Construction Products Regulation (CPR) become enforceable by law, including the CE marking of products. The CPR will directly affect all manufacturers, distributors, end users, specifiers and architects in the whole supply chain.

This will be the construction industry's most significant change for a long time in the way in which construction products are sold in Europe.

Harmonised EN Standards

From 1st July 2013, under the Construction Products Regulation 2011 (CPR), it will become mandatory for manufacturers or the legal entity that is placing a product on the market to apply CE marking to any of their products that fall under the scope of the essential characteristics of a harmonised European standard (hEN).

After applying the "CE" mark, one of the new Declarations of Performance (DoP) will have to be produced for declaring the essential characteristics, a new requirement under the CPR.

European Technical Assessment (ETA)

Where a manufacturer chooses to test fire-stopping products, for example, ablative coated boards, putty and fire stop pillows to a European Technical Assessment (ETA) that has a clause allowing for CE marking, then the manufacturer will have to also apply a CE mark and produce a DoP for the product, the same as a harmonised EN standard. DoPs are replacing the current Manufacturers Declarations, which are currently produced when declaring a performance of the product for ENs or ETAs.

Affixing of the CE mark under the provisions of the existing Construction Products Directive is currently voluntary in the UK and some other member countries, so this is a major change in some areas of the UK construction industry. The CE marking should be affixed to all construction products for which the manufacturer is declaring compliance with the regulations. From this a DoP will be produced and will reflect the CE marking requirements.

CE marking under the CPR

One of the priorities is to make all products traceable

back to the person placing the product legally on the market; the legal entity.

One of the major consequences of these duties is traceability. Distributors and importers become crucial in this respect. They can become the legal entity and they sell products under their own name and brand. If they do not, they have to sell each brand separately with its own stock record number, so that traceability is achieved back to the legal entity placing the product on the market.

For this purpose, the definition of a distributor is "any natural or legal person in the supply chain, other than the manufacturer or the importer, who makes a construction product available on the market." Not only has the product to attain conformity with the DoP, it must maintain its conformity throughout its period of storage and transportation to site.

At Exova Warrington Certification we have been involved in drafting DoP templates for hardware products and external doorsets with trade associations (DHF). These trade associations and Exova Warrington Certification will make the DoPs available on their websites very soon for members to download and use. By placing a product on the market that is CE marked you are obliged to declare its performance requirements. Once produced, DoPs can be made available on websites electronically so they do not have to be hard copies.

If a product available on the market is found not to be in compliance with the requirements of the DoP then every step should be taken to correct this or it should be withdrawn or recalled from the market. If a product presents a risk, then the competent authority of the member state should be informed immediately. Details of the non-compliance will be needed and any corrective measures should be taken. For the UK, Trading Standards will be the main organisation responsible for enforcement.

Products Already CE Marked Under the CPD

Construction products that have been placed on the market in accordance with Directive 89/106/EEC before 1 July 2013 shall be deemed to comply with the CPR. Manufacturers or the legal entity may draw up a DoP now on the basis of a certificate or declaration of conformity, which has been issued by a Notified Body before 1st July 2013 in accordance with Directive 89/106/EEC.

Guidelines for European technical approvals published before 1st July 2013 in accordance with Article 11 of Directive 89/106/EEC may be used as European Assessment Documents. Manufacturers and importers may use European technical approvals issued in accordance with Article 9 of Directive 89/106/EEC before 1st July 2013 as ETAs throughout the period of validity of those approvals.

Legally, there has also been some confusion in the change from the Construction Products Directive (CPD) to the Construction Products Regulation (CPR). While there is a difference, it is not immediately obvious. A Directive is a legislative act of the EU, which requires member states to achieve a particular result without dictating the means of achieving that result; usually through a variety of legislative procedures. When adopted, directives give member states a transposition time period for the implementation of the harmonised national legislation. Regulation is a legislative act of the EU that becomes immediately enforceable as law in all member states simultaneously.

This date is usually stated within the text of the regulation. They can be adopted through a variety of legislative procedures depending on their subject matter. The important point here is that, in the case of the CPR, there is no lengthy transition period for the harmonisation of national regulations. The regulation comes into force on the date stated, and is both national and European law from that date.

Summary

The change to CPR will not have a great effect on those already CE marking products, those member states that currently mandate CE marking under the CPD or those manufacturers whose products are subject to a European Technical Assessment or European Assessment Documents. The main change will be producing the new DoP.

However, the CPR will have a significant effect on those who may have been 'sheltering' under the CPD. There is no flexibility on the start date or duties involved.

The whole market changes on 1st July. It is really quite simple: no DoP, no CE marking; no CE marking, no product for market. IFP

CPR-at-a-Glance

Articles 13, 14 and 15 set out 'Obligation of Importers, Distributors & Manufacturers.'

Importers, Distributors and Manufacturers shall ensure products bear the CE mark before placing it on the market and has the required accompanying documents including DoP.

If a product is not in conformity with the DoP, there is a duty to withdraw or recall products.

There is now a clear duty on importers, manufacturers and distributors to inform the national authority of Member states in severe cases, in the UK the Trading Standards.

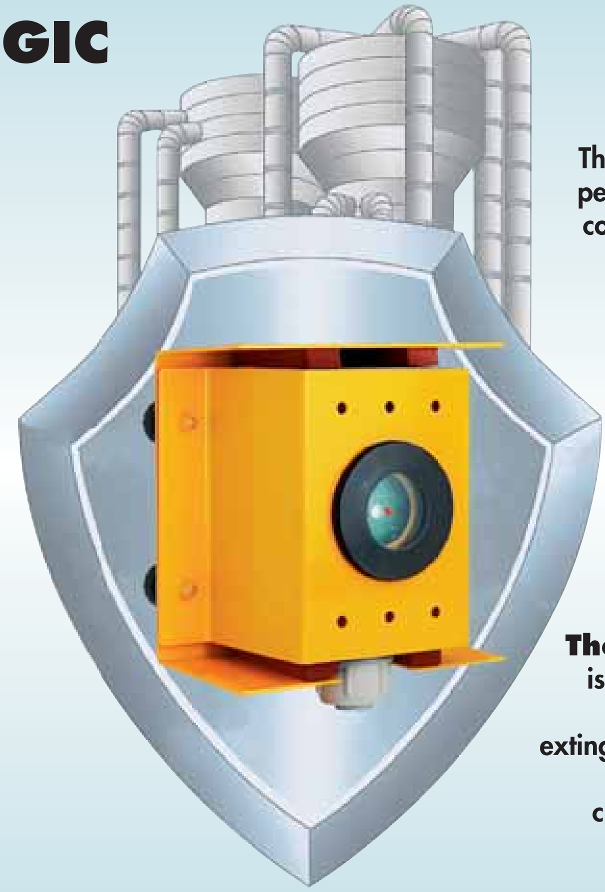
An additional requirement is for each importer, manufacturer or distributor to establish National 'Product Contact Points' to assist traceability.

Paul Duggan is Certification Manager at Warrington Certification

For further information, go to www.warringtonfire.net

CONTROL LOGIC Spark detector

designed for dust collection systems to protect storage silos from the risk of fire.



Sparks fly at high speed.

They travel at a hundred kilometres per hour along the ducts of the dust collection system and reach the silo in less than three seconds

The CONTROL LOGIC SPARK DETECTOR is faster than the sparks themselves. It detects them with its highly sensitive infrared sensor, intercepts and extinguishes them in a flash. It needs no periodic inspection.

The CONTROL LOGIC system is designed for "total supervision". It verifies that sparks have been extinguished, gives prompt warning of any malfunction and, if needed, cuts off the duct and stops the fan.

ISO 9001

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CONTROL LOGIC s.r.l.

BETTER *TO KNOW* IT BEFORE

Eye is faster than nose.

In the event of live fire
the IR FLAME DETECTOR
responds immediately

CONTROL LOGIC IR FLAME DETECTOR

the fastest and most effective fire alarm device for industrial applications

IR FLAME DETECTOR RIV-601P/FA EXPLOSIONPROOF ENCLOSURE

For industrial applications indoors or outdoors where is a risk of explosion and where the explosionproof protection is required.
One detector can monitor a vast area and responds immediately to the fire, yet of small size.

IR FLAME DETECTOR RIV-601P/F WATERTIGHT IP 66 ENCLOSURE

For industrial applications indoors or outdoors where fire can spread out rapidly due to the presence of highly inflammable materials, and where vast premises need an optical detector with a great sensitivity and large field of view.

Also for
RS485 two-wire serial line

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CONTROL LOGIC s.r.l.

All for one, and one for all

The life safety industry is continually devising new and innovative ways to make well-established technology keep people and property safe. EN 54-23 is impacting on the way fire detection systems are specified and leads the way to showing how an integrated approach to implementing different technologies can have far reaching benefits.

Stuart Davies

Hochiki Europe

Over the past 20 years or so the life safety sector has tended to work on the basis of evolution rather than revolution. Today's smoke detectors work on a very similar principle to how they did then, even though they are being constantly refined in order to improve their reliability and effectiveness. However, where the industry is continually pushing the boundaries is in the way technology is applied to create even safer environments.

Standard Bearer

This is evident in the way that the new EN 54-23: 2010 (Fire detection and fire alarm systems. Fire alarm devices. Visual alarm devices) standard addresses how visual alarm devices (VADs) should be used. The British Standards Institute (BSI) introduced EN 54-23 in order to set stricter guidelines on the installation and performance requirements of VADs and although there are already some very bright beacons currently available, none meet the requirements of the new standard.

For some time the lack of regulation on visual alarms has led to devices being chosen for convenience rather than effectiveness. Having an appropriate visual alarm signal is more important than an audible sounder in alerting those who are deaf or hard of hearing to a fire and by ensuring that VADs meet certain standards of output, and they applied correctly, they will be more effective at alerting them to possible danger.

EN 54-23 addresses the effectiveness of the light signal over a given area. As a result, compliant VADs are permitted only to emit a red or white

light and are classified into three distinct categories based on their intended application – ceiling mounted devices, wall mounted devices and an open class category.

Each of these categories has specific targets for light distribution and coverage volumes. Different light dispersion patterns and characteristics are also required according to the VAD's intended mounting position. The specified light output is the same as that specified by UL – 0.4 lumens per square metre or 0.4 Lux – while the rating of a device as defined by EN 54-23 specifies a minimum height of 2.4 metres from floor level, contrasting with BS 5839 that states that a device can be mounted at a minimum height of 2.1 metres.

Vision Express

Although much of the publicity about this standard has focused on its importance for deaf or hard of hearing people, it should be remembered that EN 54-23 compliance is also a requirement for areas of high ambient noise, such as factories, where people have to wear ear defenders to comply with health and safety legislation.

As with any proposed life safety equipment installation a risk assessment will ultimately determine whether VADs are required in a particular building. If they are, all occupants of the room should have a clear line of sight of the device wherever possible. However, if the use of an area means that direct line of sight cannot be achieved, the selection and siting of VADs should be such that the required level of illumination is provided from appropriate adjacent surfaces, by taking into account their reflectivity.

EN 54-23 also stipulates how visual alarm devices must be produced and manufacturers have until the end of March 2013 to introduce compliant products. To assist with the implementation of EN 54-23 and explain how it relates to BS 5839-1, the Loss Prevention Certification Board (LPCB) and the Fire Industry Association (FIA) and have jointly published the Code of Practice for Visual Alarm Devices used for Fire Warning (CoP0001). This provides guidance and recommendations on the planning, design, installation, commissioning and maintenance of VADs in and around buildings, other than single family dwellings.

Voice of Reason

When it comes to specifying an effective life safety system there is no room for a 'one size fits all' approach. In order to protect the widest variety of people in all types of buildings it is vital to assess the building itself and the types of people that occupy it.

For example, within high-rise buildings, voice evacuation systems are proving to be highly effective due to the way they can guide people to safety in a structured manner. The latest state-of-the-art 'intelligent' voice evacuation systems incorporate a number of essential features that can prioritise which levels to evacuate first as part of a phased evacuation strategy – so avoiding a potentially catastrophic mass stampede.

This is particularly important in multi-use locations where floors can be used for different purposes. In a hotel, for instance, with residents from a wide variety of countries, it will be necessary to pre-configure the system so that evacuation instructions are communicated in different languages. Most modern networked systems are also equipped with a live speech capability, so that when necessary the pre-configured messages can be overridden and people spoken to directly. If a building has a number of people who have impaired hearing, the voice system should be used in conjunction with VADs to provide a clear indication that there is a fire alert.

In an emergency situation time is very much of the essence, so notifying the emergency services quickly is crucial. In larger buildings a fire detection and alarm system can be connected to a third-party alarm receiving centre (ARC) to provide automatic notification of life safety emergencies and ensure the fastest possible response.

Lighting-up Time

It is clear that the integration of different types of technology into one overall life safety system has huge advantages; however, two areas that have traditionally operated independently of each other are fire detection and emergency lighting. This, however, is starting to change and new systems are now becoming available that combine the two and add a new dimension to how they can operate together.

Evacuation is usually hindered by a lack of detailed knowledge of the internal connectivity of the building space, along with confusing and poorly thought out instructions. Studies have also shown that in these situations occupants usually make use of familiar routes – typically using the exit through which they entered the building. Even more worryingly, research from the University of Greenwich, which is currently undertaking a study called the Human Behaviour in Fire Network (HUBFIN), found that only 38 percent of people see passive signage in an emergency.

Although it has been possible to enable emergency lighting to be activated at the same time as the fire detection system, what it has not been able to do is guide people out of a building by instructing them about which way to go and, just as importantly, where not to go.

Even if the signage is noticed, a traditional emergency lighting system does not allow signs to be 'shut off' that can direct people into the path of danger. By integrating the fire detection system with the emergency lighting, and by identifying where in the building the fire is taking place, the correct route can be configured and communicated. By responding to information sent from the fire detectors it is now possible to illuminate a red 'X' on specific emergency exit signs, which signals to people not to exit via that particular route.

On the Move

As the previously mentioned example of high-rise buildings demonstrates, voice-based technology can be incredibly useful in the right situation. However, it is only effective in advising which exit route to take if those listening speak the same language. If they do not, or are unfamiliar with the environment and building layout, voice-based instructions can hinder rather than help.

Not only does integration of fire detection, warning and evacuation systems make good sense from a safety point of view, it has a number of cost saving and environmental benefits. One leading manufacturer has managed to reduce the wiring content of its integrated system by up to 75 percent and, as there is only one loop with both functions, it instantly reduces this part of the installation by 50 percent. In addition, its


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luminaires use light emitting diodes (LED) that consume less than 0.5W – a similar 8W fluorescent light exit luminaire will consume approximately 12W.

Problem Solving

Integrating a range of technologies to provide the best possible solution for a particular environment can also result in fewer unwanted alarms. These are a serious problem, are disruptive for the occupiers of premises and can divert fire service resources away from more urgent matters.

According to statistics published by the UK's Department for Communities & Local Government, out of 727,000 attendances to premises by fire and rescue services in 2008, 399,200 were due to false or unwanted alarms. Almost five years later fire crews are still being needlessly called out when alarms are activated due to occurrences such as burning toast.

Fire and rescue services around the world are now requesting that offices and factories check that there is a genuine blaze before dialling the emergency services and although this is reducing the number of unnecessary call outs, it is not enough. Not surprisingly, there is mounting support for those that routinely raise false alarms to be served with an improvement notice that, if breached, will result in court action.

Call to Action

The most common causes of unwanted alarms are poor product selection, misguided installation, the activities of people or processes within the building, and/or little or no system maintenance. Some manufacturers build in features to their products to reduce unwanted alarms. For instance, optical chamber technology has been developed that minimises the differences in sensitivity experienced in flaming and smouldering fires, resulting in a chamber that is equally responsive to all smoke types.

Variable sensitivity products can be controlled via a time clock or an event such as a security alarm being set/unset – taking into account the different occupancy levels during a period of time. An alarm in a commercial premises is less likely to go off between the hours of 8pm and 5am than it is between 8am and 5pm and therefore an adjustment in sensitivity may be desirable.

Products are also available that have a compensation feature against dust or dirt build up. They automatically adjust the alarm threshold to account for any contamination within the sensor chamber, resulting in increased longevity and robustness. However, even with drift compensation algorithms employed, the physical removal of dust will eventually become necessary and a good maintenance regime will ensure this happens at the appropriate time.

With some detector designs it is possible to simply and quickly dismantle the detector, remove the chamber and clean or replace it on site. It is important to note that this should only be done where the manufacturer can guarantee that once the detector has been reassembled it will automatically recalibrate itself. Calibration in this way ensures that the sensitivity of the sensor is the same from the day it was installed until the contamination is beyond compensation, at which point it should again be serviced.

Onwards and Upwards

Although standards are important in maintaining a consistent approach to the specification and installation of life safety technology, it should always be remembered that this type of regulation is only ratified after the technology is developed and may take several years to get from inception to publication – in effect, by the time it is published it is out of date. Therefore, trends such as the integration of fire detection and emergency lighting based technology represent the real future of the industry and when installation, commissioning and maintenance savings are also factored in alongside the user friendly and enhanced safety attributes of an integrated system, the case in its favour is an incredibly persuasive one. IFP

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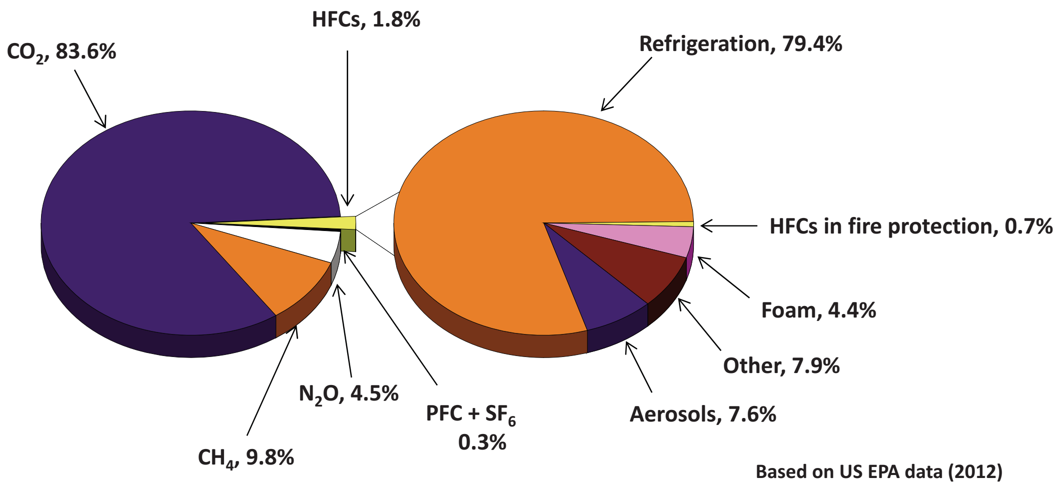
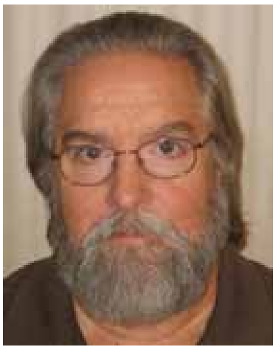
For further information, go to www.hochikieurope.com



The impact on climate change of HFCs in fire protection represents 0.01% of the impact of all GHGs

Environmental Regulations & HFC-based Clean Fire Extinguishing Agents



Mark L. Robin

DuPont Chemicals & Fluoroproducts

Since their introduction in the early 1990s, hydrofluorocarbon (HFC) based clean agents have been the most widely specified products for the protection of sensitive, valuable and mission-critical equipment and assets. No other issues related to these agents are perhaps more misunderstood or misrepresented than their environmental impact and the implications of regulations on their use in fire extinguishing applications.

The Montreal Protocol

The Montreal Protocol applies only to ozone depleting substances (ODSs), i.e., substances with a non-zero ozone depletion potential (ODP). HFC-based clean fire extinguishing agents have zero ODPs, and are therefore not subject to the provisions of the Montreal Protocol.

The Kyoto Protocol

The Kyoto Protocol entered into force in 2005, and covers a "basket" of six greenhouse gases (GHGs): carbon dioxide, nitrous oxide, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride. The primary objective of the Kyoto Protocol is to reduce GHG emissions. Key aspects of the Kyoto Protocol include emissions targets, timetables for industrialised nations to reduce emissions, and the development of policies and procedures for meeting those emissions targets.

The Kyoto Protocol does not ban or place any restrictions on the use of any GHGs, including HFCs. Hence, the Kyoto Protocol does not ban or restrict the use of HFCs in fire extinguishing applications.

The F-Gas Regulation

Regulation (EC) No 842/2006 of the European Parliament and of the Council on certain fluorinated greenhouse gases, the "F-Gas Regulation," was published on May 17, 2006, and entered into force in 2007. The F-Gas Regulation comprises fifteen articles, as shown in Table 1.

Table 1: The F-Gas Regulation

Article	Title	Description
1	Scope	"The objective of this Regulation is to contain, prevent and thereby reduce emissions of the fluorinated greenhouse gases covered by the Kyoto Protocol."
2	Definitions	Definitions
3	Containment	Requires operators to prevent leakage of fluorinated GHGs and to repair leaks; establishes leakage checking schedule
4	Recovery	Requires recovery of fluorinated GHGs to ensure their recycling, reclamation or destruction
5	Training/Certification Programs	Requirements for mutual recognition of training programs & certification for personnel involved in the activities of Articles 3 and 4
6	Reporting	Reporting requirements for producers, importers, exporters
7	Labelling	Labelling requirements
8	Control of Use	SF_6 use prohibited in Mg die-casting unless below 850 kg/year; SF_6 prohibited for tire filling
9	Placing on the Market	Prohibits placing on market of fluorinated gases in certain applications (listed in Annex II) ; no restrictions on HFCs in fire extinguishing
10	Review	Schedule for Commission review and report publication
11	(no title)	Allows Member States to promote the placing on the market of products and equipment that use alternatives to high GWP gases
12	Committee	F-Gas Regulation Committee assists the Commission
13	Penalties	Member States define their own sanctions for infringements of provisions
14	(no title)	Member States may introduce more stringent measures in relation to Articles 7, 8 and 9
15	Entry into Force	Regulation shall apply with effect from July 4, 2006, with the exception of Article 9, which shall apply from July 4, 2006

Table 2. Proposed F-Gas Regulation [*COM(2012) 643 Final, November 7, 2012*]

Article	Title	Description
1	Definitions	Definitions
2	Prevention of emissions	Requires operators to prevent leakage of fluorinated GHGs and to repair leaks; requires certification of personnel involved in installing, servicing, maintaining, repairing or decommissioning equipment containing fluorinated GHGs
3	Checking for leakage	Requires operators to check for and repair leaks; establishes leakage checking schedule
4	Leakage detection systems	Equipment containing a fluorinated GHG with a GWP ^{3} 500 must be provided with a leakage detection system and checked for leakage at least every 12 months
5	Record keeping	Record keeping requirements: quantity and type of fluorinated GHGs installed/recovered, leakage rates; dates
6	Emissions from production	Producers shall limit emissions to greatest extent possible during production, transport and storage; HFC-23 produced as a by-product in significant quantities shall be destroyed
7	Recovery	Requires recovery of fluorinated gases to ensure their recycling, reclamation or destruction
8	Training and Certification	Member States shall establish training & certification programs for personnel involved in installing, servicing, maintaining, repairing or decommissioning equipment containing fluorinated GHGs
9	Restrictions on the placing on the market	Prohibits placing on market of fluorinated gases in certain applications (listed in Annex III); includes fire protection systems that contain HFC-23
10	Labelling and product information	Labelling requirements
11	Control of use	SF_6 use prohibited in Mg die-casting and recycling of Mg die-casting alloys unless quantity of SF_6 < 850 kg/year SF_6 prohibited for filling of tires Use of fluorinated GHGs with GWP ^{3} 2500 to service or maintain refrigeration equipment with a charge size equivalent to ^{3} 5 tonnes of CO2 prohibited from 1 Jan 2020
12	Pre-charging equipment	From 3 years after entry into force, refrigeration, AC and heat pump equipment shall not be charged with HFCs before placed on market or before made available to the end user for first install – does not apply to hermetically sealed equipment
13	Reduction of the placing on the market of hydrofluorocarbons	Establishes a cap and reduction program for HFCs. In 2015 a cap equal to the average HFC production for the years 2008-2011 is established and a reduction schedule established resulting in a reduction to 21% of the 2008-2011 average by 2030

14	Allocation of quotas for placing HFCs on the market	By 31 Oct 2014 the Commission shall determine for each producer or importer a reference value based on the annual average quantities of HFCs produced or imported from 2008-2011
15	Quota registry	Electronic registry for quotas for placing HFCs on market shall be established
16	Transfer of quotas	Transfer of quotas is allowed
17	Reporting on production, import, export & destruction	Reporting requirements for producers, importers, exporters
18	Collection of emissions data	Member States shall collect data on emissions of fluorinated GHGs
19	Review	Review processes and schedule for Commission to publish reports
20	Exercise of the delegation	Power to adopt delegated acts is conferred on the Commission
21	Committee procedure	The Commission shall be assisted by a committee
22	Penalties	Member States define their own penalties for infringements
23	Repeal	The current F-Gas Regulation shall be repealed
24	Entry into Force	Entry into force on 20th day after publication in the Official J.Eur. Union

The F-Gas Regulation & Fire Suppression Systems

The primary objective of the European F-Gas Regulation is to reduce emissions of the fluorinated gases covered by the Kyoto Protocol. The current regulation recognises that fire suppression applications are essentially non-emissive, and does not impose any restrictions on the use of HFCs in fire suppression applications. The Articles of the F-Gas Regulation most relevant to fire extinguishing are article three through to article seven.

Article 3 (Containment)

Article 3 requires operators of fire protection systems to prevent leakage of fluorinated GHGs, repair leaks and establish an inspection schedule. Article 3 requirements are satisfied by the existing inspection regimes established by the ISO 14520, EN 15004 or NFPA 2001 standards.

Article 4 (Recovery)

Article 4 requires that operators of fire protection systems put in place arrangements for the proper recovery of fluorinated GHGs. Currently several

Table 3. Reduction Schedule

Years	Maximum Quantity of HFCs (based on tonnes of CO_2 equivalent) That Can be Placed in the Market
2015	100% (of 2008-2011 average)
2016-2017	93%
2018-2020	63%
2021-2023	45%
2024-2026	31%
2027-2029	24%
2030	21%

commercial entities are actively involved in the recovery and reclamation of HFC-based clean fire extinguishing agents.

Article 5 (Training & Certification)
Article 5 requires training and certification of personnel involved in the handling of fluorinated GHGs. Such programs have been in place for almost a decade within the fire protection sector.

Article 6 (Reporting)
Producers, importers, and exporters must report their total production, applications, quantities of gas placed on the market, quantities imported or exported, and any quantities of gas recycled, reclaimed or destroyed. The Commission protects the confidentiality of the information submitted.

Article 7 (Labelling)
Equipment or products containing fluorinated GHGs must have the chemical name and GWP of the gas, and an indication that the product or equipment contains fluorinated GHGs, displayed on the label.

Proposed Changes to the F-Gas Regulation
On November 7, 2012 the European Commission published a proposal to update the F-Gas Regulation [*Proposal for a Regulation of the European Parliament and of the Council on fluorinated greenhouse gases, COM(2012) 643 Final, November 7, 2012*]. The document comprises a series of proposals, and as such, the next version of the F-Gas Regulation could contain all, some, or none of these proposals.

As indicated in Section 3 (Legal Elements) of the proposal, "The proposal maintains the current provisions of the F-Gas Regulation, with adjustments to ensure better implementation and enforcement of the legislation by national authorities." The proposal comprises 24 Articles, as described in Table 2, and mainly targets the use of fluorinated GHGs used in the servicing and maintenance of refrigeration equipment. Articles of relevance to HFC-based clean fire extinguishing agents are highlighted in Table 2.

The HFC-based clean fire extinguishing agents FM-200 (HFC-227ea), FE-25 (HFC-125), and FE-36 (HFC-236fa) are not targeted for a ban within this Proposal.

The vast majority of the requirements in the proposal relevant to fire suppression are either already being met by industry or will require minimal effort to comply with, for example those pertaining to emission prevention (Article 2), leakage checking and detection (Articles 3 and 4), record keeping (Article 5), limitation of production emissions (Article 6), recovery (Article 7), training and certification (Article 8), labelling (Article 10), production/import/export reporting (Article 17) and emissions data collection (Article 18).

Article 13 through to article16 propose an overall cap and reduction of HFCs on a GWP-weighted basis over a specific time period. Section 3 of the proposal indicates "The phase-down mechanism involves a gradually declining cap on the total placement of bulk HFCs (in tonnes of CO_2 equivalent) on the market in the EU with a freeze in 2015, followed by a first reduction in 2016 and

Table 4. Comparison of Clean Fire Extinguishing Agents (✔ = Desired Property)

Ideal Halon Replacement	Halon 1301	HFCs	Inert Gases	Perfluoroketones
Gaseous agent	✔	✔	✔	
Low chemical reactivity	✔	✔	✔	
No effect on biological tissues	✔	✔	✔	
Electrically non-conducting	✔	✔	✔	✔
High weight efficiency	✔	✔	✔	
Low agent cost	✔	✔	✔	
Low system cost	✔	✔	✔	
Low storage volume	✔	✔		✔
Low number cylinders	✔	✔		✔
Low cylinder pressure	✔	✔		✔
Low manifold pressure	✔	✔		✔
Low enclosure pressure	✔	✔		✔
Zero ODP		✔	✔	✔
Zero GWP			✔	
Non-VOC	✔	✔	✔	

reaching 21 percent of the levels sold in 2008 to 2011 by 2030." Table 3 shows the proposed schedule as indicated in Annex V of the proposal.

Under the cap and reduction, manufacturers would be provided an established quota for HFCs within the EU based upon historic usage (average of 2008-2011). This allows manufacturers to manage high priority business segments to ensure future supply and provides certainty on future demand.

Article 9 proposes to prohibit placing HFC-23 on the market after 1 January 2015. This proposal is in line with the intent of the proposal to avoid the use of certain gases "where there are safe and energy efficient alternative technologies with no impact or a lower impact on the climate." HFC-23 is employed in only a very small selection of niche fire protection applications. The utilisation of HFC-227ea in place of HFC-23 would, for example, represent an almost 80 percent reduction in potential climate impact based on their respective GWP values. It should also be noted that recent advances in chemistry have made HFC-23 a valuable feedstock material for the production of pharmaceuticals and agrochemicals.

Conclusion

The use of HFCs in fire protection applications is not banned or limited by current environmental regulations, including the Montreal Protocol, the Kyoto Protocol, and the European F-Gas Regulation. Currently proposed changes to the F-Gas Regulation do not target the primary fire extinguishing agents for a ban or phase-out.

The proposed cap and allocation scheme for HFCs in Europe would provide manufacturers with a verified quota for products within the EU based upon historic usage. Such a quota allows manufacturers to manage high priority business segments for future supply and provides certainty on future demand.

To date no product or technology has been found that satisfies all of the criteria of the ideal Halon 1301 replacement. Each class of clean fire extinguishing agent (HFCs, inert gases and perfluoroketones) has strengths and weaknesses, and clean agent selection must be based on the physical and chemical characteristics of the agent along with detailed knowledge of the specific project requirements. As seen from Table 4, no agent satisfies *all* of the requirements of the ideal Halon replacement; however, Table 4 shows that HFC-based clean fire extinguishing agents provide the best overall combination of the desired properties.

Current regulations do not ban the use of HFCs in fire protection applications. The proposed changes to the F-Gas Regulations, should they be adopted, will not ban the use of HFCs in fire protection. The proposed cap and reduction proposal will provide regulatory certainty for the fire suppression industry while allowing users and fire protection engineers to continue to select the most efficient and technically sound fire protection option for critical equipment and facilities – all while reinforcing emission reduction goals, responsible use of clean agents, and global climate change commitments. IFP

Mark L. Robin is Senior Technical Services Consultant at DuPont Chemicals & Fluoroproducts

For further information, go to www.dupont.com

Understanding the Fire-stopping – Par

Christopher DeMarco

Specified Technologies

In previous editions of *International Fire Protection* we learned that a fundamental fire protection strategy is to divide a building into fire-rated compartments intended to contain fire to the compartment of origin. When openings are created in the fire-rated walls and floors forming the compartments, their fire rating and ability to resist smoke migration is compromised. Often, openings cannot be avoided, in the case of penetrants or when barriers intersect.

This article is the final part of a three-part series. In Part One, we defined fire-stopping as the process of installing third-party tested and listed materials into openings in fire-rated barriers to restore fire-resistance ratings and talked about through-penetration fire-stops (mostly mechanical, electrical and plumbing applications). Part Two discussed construction joints and perimeter fire barriers (curtain wall). In this article, we will look at fire-stopping data cables; a huge source of life-safety violations due to the frequent changes they require, healthcare, and industrial applications.

Fire-stopping Data Cables

It is impossible to conceive of a modern commercial, institutional, or hospital building that would not have miles and miles of cables in it. We consider that not just normal but necessary. But what most people do not know is that plastic jacketed cables are a huge source of fuel for fire. For example a typical 45 cm by 10 cm cable tray fully loaded represents 150,000 BTU/foot. That is the equivalent of four litres of gasoline. So, without a doubt, fire-stopping cables is something that must be done correctly and remain correct throughout the buildings life.

Fire-stopping of cables, particularly data (low voltage) cables, is therefore an important topic to understand considering the nature of modern building construction. Unlike a building's electrical system that more or less does not change, advances in technology necessitate constant data cable changes and upgrades. Data signals that were once capable of being transmitted through Category 3 cable now must travel through Category 6 or 6A cable. Copper cables are being supplemented or replaced by fibre optic cables. Thinking about a typical healthcare facility, additional equipment such as computers, medical imaging devices and telephones are often added or upgraded. It is no wonder that data cabling

Basics of
t 3

accounts for the majority of on-going fire-stopping issues in buildings today.

High Traffic Openings

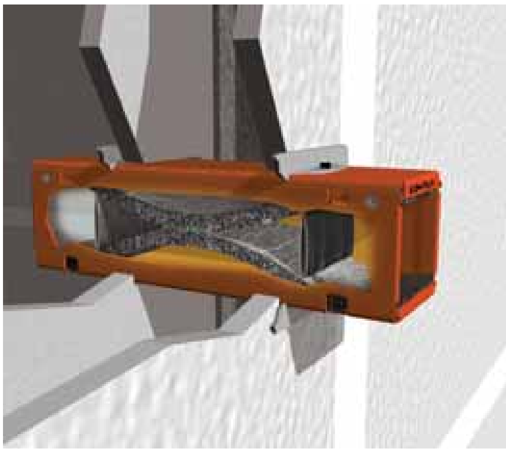
We call situations subject to frequent changes and/or additions, as with data cables, "high traffic openings." They require removal and reinstallation of the fire-stop system to accommodate changes. Because of this, selection of the fire-stop system is critical to ensure changes are easily accommodated. If the fire-stop system is not flexible enough, chances are good it will not be in compliance very long, placing additional burdens on the healthcare facility (or other) to ensure that barriers remain protected and code compliant.

Product Options for High Traffic Openings

Today's fire-stop market offers a wide range of product types. Some are intended to be more permanent in nature and used to fire-stop a wide variety of common building service elements, while others are designed specifically for the special needs of building data cabling. Fire-stop sealants, often latex based, are good products for generic fire-stopping, but typically not the right ones for cabling, as they will tend to glue the cables together.

Products that can be retro-fitted are designed so the same product can be easily removed from the opening to facilitate a cable change or add, and reinstalled without the need for fresh product. For smaller openings, such as a small cable bundle through a sleeve, putty products such as SpecSeal fire-stop putty are a good product to use. Putty products are packed by hand into the space around the cables, although they may be difficult to get into the cable bundle to fill interstitial spaces for airflow and smoke control.

For larger openings, such as where multiple cable bundles or cable tray pass through a barrier, a product such as SpecSeal fire-stop pillows would be a better choice. They consist of an intumescent cushion that is compressed and tightly fitted into an opening. Installation is very fast and easy, with great simplicity to retrofit. The design is such that only one pillow needs to be removed and reinstalled to accommodate change, unlike other



products that may require a much greater portion of the fire-stop to be removed and reinstalled. Further, the fire-stop pillows offer a tight seal for air and smoke control.

The options described above are good solutions to a building's basic fire-stop needs. However, there is more to it than just installing sealant, putty or pillows around the cables. Fire-stop systems will specify a maximum cable fill permitted in an opening, based on the codes. This is to ensure sufficient fire-stop product is present to prevent the passage of fire. While not overly complex to calculate, the cable fill will need to be recalculated with each change to ensure the opening remains in compliance. In healthcare environments, where cable additions and changes are frequent and work is done under tight deadlines, cable fill rapidly grows and is a major cause of life safety violations.

Best Option for Fire-stopping Data Cabling

Today, fire-stop products that are specifically designed to allow quick and safe changes of electrical and data systems are available. The best known and only reliable one is called EZ-Path, which was introduced about ten years ago. It is the only one that incorporates a self-adjusting and self-sealing fire-stop system accommodating 0 percent to 100 percent cable fill while allowing complete freedom of cable changes or additions without having to remove or add any material or recalculate cable fill. Further, there is absolutely no need to activate the device in any way to maintain fire or smoke control performance. Not surprisingly, EZ-Path has been embraced with open arms by the IT community and is quickly becoming the standard product used for running low-voltage cabling in North America.

The sensitive nature of data systems must be kept in mind and EZ-Path does this exactly. To protect cables, surfaces are smooth without sharp or rough edges. No loose surfaces are present that could hinder easy cable pulls. Cables are neatly held, minimising interstitial spacing between

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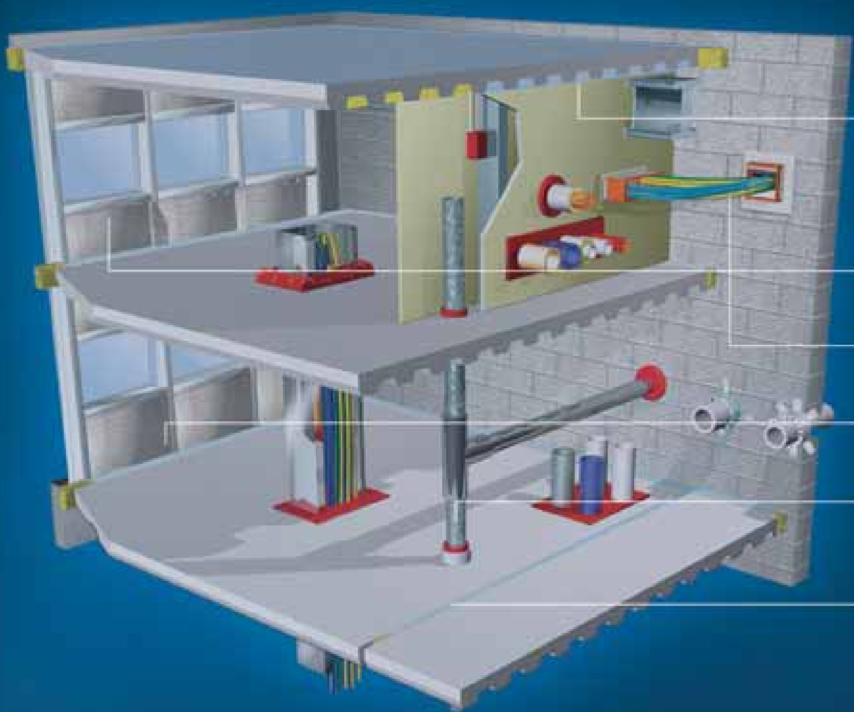


cables and minimising smoke migration. By not squeezing the cables there is little potential for cross-talk.

Special Considerations for Healthcare

In healthcare, the potential spread of infection and patient privacy are major concerns. All other devices require access to at least one side of every wall to add cables. Most require access to both sides. Thus, every cable change has the potential to spread disease-carrying dust, not to mention the cost and disturbance of setting up containment at every opening. Only the EZ-Path system requires no unsealing, resealing, or adjustment of any kind. Pulling lines can be left in place and cables remotely pulled through multiple barriers. So no direct access to the device is required other than at the beginning and end of the pull.

When evaluating which fire-stop system to use, it is important to consider present capacity and future expansion. Devices such as EZ-Path can be ganged, allowing multiple devices to be joined to provide huge present capacity as well as added capacity for future use. Thus significantly more cables than otherwise possible can be run in very tight spaces. An additional benefit is the ability to segregate cables for easy organization and identification.

Fire-stopping for Industrial Applications

Thoughts of industry often conjure images of large factories incorporating machinery, miles of pipe and cable, with sparks flying as the backbone of economies worldwide operate at a feverish pace. From a fire-stop perspective, the images are of large openings with mixed penetrant types and sizes often with difficult access. Certain types of industry, such as computer chip plants, need very clean environments.

Similar to healthcare environments, low voltage (data) cable changes and additions may be frequent whereas electrical cabling and piping remain more or less unchanged. As we learned in Part One of this series, to successfully pass the requirements the Standards ASTM E814 and UL1479, the fire-stop system not only must resist the passage of fire but also the rigors of the hose stream test. Large openings often include expansive voids (annular space) that impose challenges for typical fire-stop products to meet these standards. Selection of the proper fire-stop products and systems is crucial.

Product Options for Industrial Applications

In many situations, fire-stop sealants are a good solution for general fire-stopping. While fire-stop systems are available for medium sized openings and annular space, often they require application over high temperature insulation (mineral wool). Sealant is typically applied at the top surface of the floor or at both sides of walls. But in a large opening filled with conduits, troweling sealant over wide openings or reaching the centre of a filled opening will be challenging.

Fire-stop pillows represent an excellent alternative, as they would typically be applied from one side of an opening without the use for any other product. Rather than packing insulation into the opening and navigating a maze of penetrants with a trowel to apply sealant, the pillows are particularly well suited for conditions where access is limited since installation is a one-step process by simply compressing them into the opening.

For all size openings, especially large openings, SpecSeal Composite Sheet consists of sheet steel with an intumescent coating on one side. SpecSeal

Composite Sheet is much stronger, thinner, lighter and easier to cut than any other steel sheet products on the market. Although installation may be slightly more involved in comparison to pillows, composite sheet allows large openings to be firestopped quickly and can be bent for creative installations. Composite sheet is durable, and may be a good choice for harsh environments.

Outside of through penetrations, industrial situations have a need to protect cabling. Imagine trays of cables snaking through a factory, passing by various processes emitting sparks and other similar hazards. Cable ignition would not only render machinery inoperable, but could be a path for quick fire propagation throughout the facility. Protecting cables with spray-applied coatings, Such as SpecSeal cable spray minimises the tendency for cable ignition and, should ignition occur, slows or eliminates propagation to other areas. In wide open spaces such as factories that are not separated by fire rated barriers to contain fire to the point of origin, cable coatings such as this serve similar purposes.

Summary

High traffic openings, typically for data cables, are a major headache for IT personnel, as they require constant changes. These are the Number One source of life safety violations for most buildings as walls are turned into Swiss cheese and cable fill quickly exceed limitations of typical firestop systems.

They also cause tremendous frictions between departments, as the IT people need to run their cables, whereas the facilities and safety folks want to keep their walls and floor safe. The needs of healthcare and industrial facilities have also changed over time. Current solutions take these needs into account such as devices that allow for cable changes without the need to remove or add any material or activate in any way. Special consideration must be given to large openings frequently found in industrial environments due to access concerns and ability to meet building code required test standards. Still, fire-stopping is usually a simple process when thought of ahead of time, and can become painful and expensive if done after the fact. Avoiding it altogether will put any type of structure at risk, even if it is protected by sprinklers. IFP

Christopher DeMarco is Manager of Technical Services and Applications Engineering at Specified Technologies Inc.

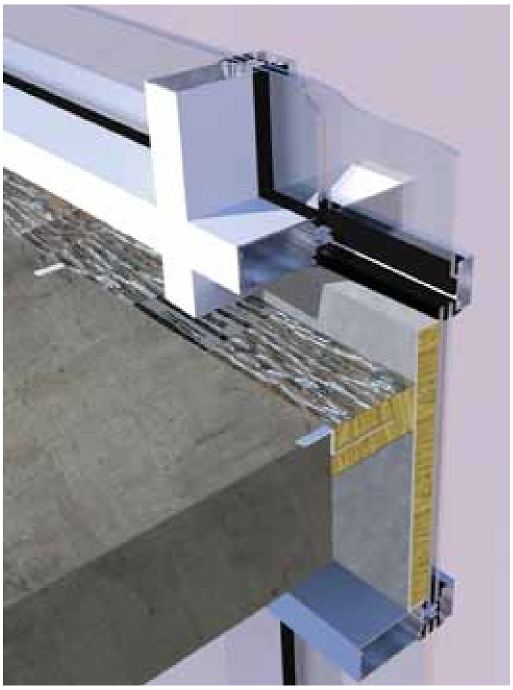
For further information, go to www.stifire-stop.com

Andy Kay

Association of Specialist Fire Protection

Keeping up the Fa

The prospect of a fire in a tall building is always an emotive subject, as the potential for loss of life is that much higher. *Towering Inferno* was one of the most popular movies of the 1970s and the image of people gambling on the smallest chance of survival by jumping rather than being burned alive was an extremely powerful one.



Curtain wall cavity barrier

Unfortunately, fantasy all too often mimics real life and there is a long history of fatal fires in tall buildings dating back well over 60 years. In 1946, a fire in the Winecoff Hotel, Atlanta GA cost 119 lives, many as a result of jumping. Other notable disasters – such as the 1974 Joelma building fire in São Paulo, Brazil (179 deaths), the Hotel Dupont Plaza in San Juan, Puerto Rico (97 deaths) in 1986, and the 1996 Garley Building fire in Hong Kong (41 deaths) – have made those responsible for building codes and regulations around the world sit up and take note.

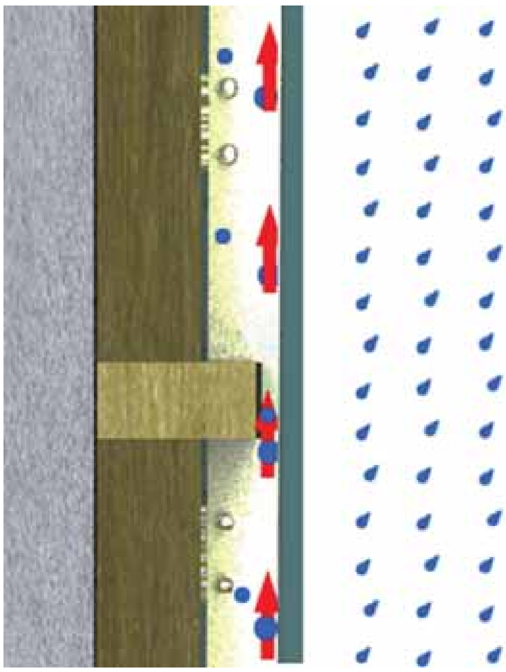
Mercifully, there have been relatively few lives lost as a result of fires in high rise construction in Europe. However, recent incidents – for example, the complete destruction of the Torre Windsor Tower in Madrid in 2005, where issues with the curtain wall cavity fire breaks contributed to the fire spread; and the 2012 Polat Tower fire in Istanbul, where the flames spread behind a rain-screen cladding system – highlight the need for continued vigilance.

Role of Cavity Fire Breaks

The cavity fire breaks required in cladding systems vary with the type of façade. In a curtain wall system, the cavity break sits behind the façade, between the edge of the building slab and the façade itself. It is therefore inside the building and its purpose is to act as a continuation of the floor slab right up to the façade, while allowing for dynamic movement that can be caused by a number of differing factors. The taller the building, the more movement will need to be accommodated.

The installation of a cavity barrier that cannot cope with the continual stresses imposed by positive and negative wind loads will eventually lead to a breakdown in the fire compartmentation measures designed to prevent the passage of flames and smoke from one floor to the next. In 1997, a fire broke out in the President Tower Building in Bangkok. The fire started due to a vapour explosion on the 7th floor of the 36-storey tower. Although the fire spread to only four other floors, it claimed the lives of three occupants of the building. The building's owners wanted to understand why the fire had spread outside of the fire compartments and so employed Building Diagnostics Asia Pacific (BDAP) to carry out a forensic study on the causes and spread of the fire.

Peter Hartog of BDAP wrote a detailed report in which he stated that the fire had "… spread rapidly through openings in the floor, including the gap between the curtain wall and the concrete slab". The cavity barriers had all been installed correctly and, had the building been in London, Paris or Rome, the fire-stopping measures at the slab edge would have complied with the building regulations at that time. In fact, they would still comply now. The report went on to find that "… the conven-



Rainscreen system

çade

tional fibre fire stops were no longer flexible. All such forms of attachments are likely to fail as curtain wall extrusions deform".

In addition, BDAP considered that "… the aluminium support members moved significantly during the early stages of the fire and that this movement would have formed routes for fire spread."

Realistic Fire Tests

So how is it that there are products available in the European market that have the potential to fail in a fire? The problem has been the lack of a requirement to test the products in a realistic test scenario. There has been no requirement to test for cyclic movement or for the test set-up to replicate a curtain wall façade.

In the UK, products have traditionally been tested to BS 476: Part 20: 1987: Fire tests on building materials and structures. Method for determination of the fire resistance of elements of construction (general principles). This test provides a means of quantifying the ability of elements to withstand exposure to high temperatures, by setting criteria by which the load-bearing capacity, the fire containment (integrity) and the thermal transmittance (insulation) functions can be judged. It is a static joint test whereby the cavity barrier is fitted between two substrates, normally concrete to concrete but there are products tested concrete to masonry or concrete to aerated blockwork.

None of these can replicate in any way the performance of a curtain wall. It has therefore become commonplace for companies to manufacture variants on a standard rock-fibre slab that can meet the integrity and insulation values required by the test. These products have a horizontal fibre orientation that, while good for stability, cannot accommodate the sort of movement that is imposed daily through wind loadings, let alone the distortion of the mullions and transoms as seen in the President Tower fire.

Fortunately, a new test standard EN1364-4: 2007: Fire resistance tests for non-loadbearing elements. Curtain walling is now in place and European Technical Approval 26 clearly states that this is the method to which cavity barriers must be tested if they are to be used in a curtain wall application. The test is conducted using two floor levels of curtain wall and replicates the kind of movement of both the floor slab and façade that can occur in a fire.

In order for products to pass this more stringent test they need to be engineered in a different way to the standard rock-fibre slabs. The orientation of the fibre needs to be changed from horizontal to vertical in order to make the product compressible. This can be done on site, involving traditional rock-fibre being hand cut, re-oriented to the vertical and then compressed into the gap. The rock-fibre is then coated in either an acrylic spray or a pourable silicone. These products can be problematical in wet or cold conditions.

Alternatively, the product can be engineered in a factory environment where the orientation and compression is regulated and therefore consistent.

Polat Tower blaze. Pic courtesy fotostory/ Shutterstock.com

A foil coating is then applied to the rock-fibre assisting its integrity, insulation and acoustic performance. At least one spray system and one dry system have been successfully tested to the new test standard and the products are available in the European markets.

Rainscreen Façades

The purpose of the cavity fire barrier in a rainscreen façade is to prevent the spread of fire in the cavity between the exterior insulation and the cladding panels. In the UK, the building regulations require 30 minutes' integrity and 15 minutes' insulation (although there is no insulation requirement in Scotland). However, in a rainscreen system, there is a need to maintain constant airflow for ventilation purposes. This serves not only to aid the spread of flames and smoke, but also to make traditional cavity barriers that close right across the gap unusable.

The industry has therefore developed products that, while maintaining the requisite air gap, have an intumescent component that will react to close the gap in the event of fire. The maximum air gap that is required is usually 25mm and it is important to close this gap as quickly as possible before the fire has a chance to bypass the fire break.

There is currently an Association for Specialist Fire Protection (ASFP) working group looking at a fire test method for rainscreen cladding cavity barriers and while there is discussion on recommending a maximum closure time in the region of five minutes, it is always preferable to keep this time as low as possible.

It is always in the interest of designers and contractors to get a copy of the relevant fire test reports (or assessments) from a manufacturer to satisfy themselves that the products are suitable for the intended application. The responsibility, and therefore liability, will always lie with the designer to ensure that he has specified the right product, and the installer to ensure that he has installed it in accordance with the manufacturers' recommendations. IFP

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For further information, go to www.asfp.org.uk

Intermodal Transport – Addressing the Fire Safety Challenge

Scott Starr

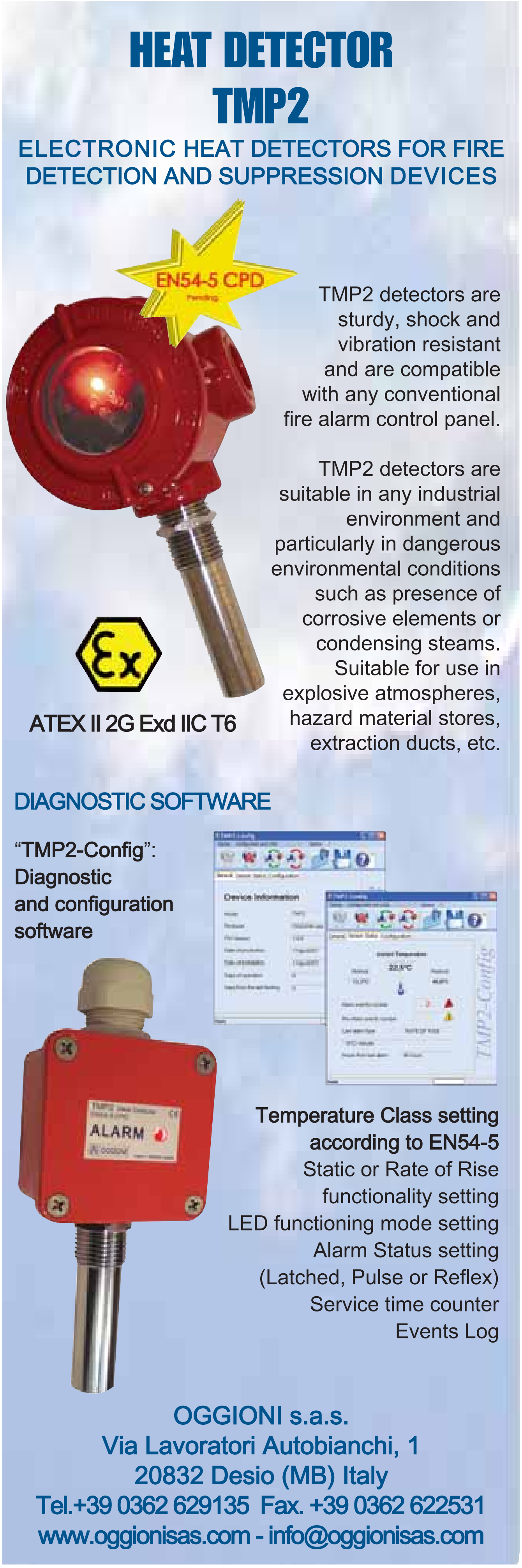
Firetrace International

The risk that fire poses to the efficiency and reliability of intermodal transportation has resulted in many of the industry's decision makers taking the threat more seriously. So much so that automatic fire suppression is now regularly being fitted to "mission critical" mobile, handling and transportation equipment.

The worldwide growth of consumerism and the globalization of business in the past handful of decades have been made possible, in part at least, by a revolution in the way in which freight is transported across the world. The success, or otherwise, of these highly-containerized operations has an undeniably swift and significant impact on the economy of every developed country. So, it is false economy in the extreme to put at risk the smooth running of these operations by failing to provide essential equipment with adequate fire protection.

The risk is the possible complete disruption of logistics operations, the very real prospect of injury or death of employees, significant revenue losses due to unscheduled downtime, the loss of expensive equipment that can easily take months to replace, and customer satisfaction levels that can plummet.

But just how real is the fire risk in mobile equipment?



The answer is very real; far more frequent and often far more devastating than you might expect. For example, one of the USA's leading international transport and logistics insurers is on record as acknowledging that mobile equipment fires are widespread at ports and terminals. In a two-year period, this company alone received 50 claims for hydraulic fires in mobile equipment. According to its records, straddle carriers, cranes and lift trucks account for just short of 80 percent of claims. Significantly, this dwarfs the number of claims made for fires in buildings where almost certainly the majority have some sort of fire detection or fire suppression equipment fitted.

What is the Fire Risk?

With such a plethora of equipment to protect it is perhaps understandable that the task can appear daunting, embracing as it does everything from port operations to road and rail transportation. In modern ports, mobile logistics equipment spans from rail-mounted straddle handlers to container cranes, wheeled cranes to gantry cranes, stackers to container handlers, and lift trucks to heavy fork lifts.

However, the reality of the situation is that these pieces of mobile equipment have many characteristics in common. They share the most frequently occurring fire risk areas. All have engine or motor compartments, battery compartments, high-heat sources such as transmissions, torque converters and braking systems, and high ignition potential areas such as belly pans, hydraulic/fuel pumps and high pressure hoses.

That these are the main risk areas is borne out by research conducted by the US Department of Homeland Security's NFIRS [National Fire Incident Reporting System] and the NFPA [National Fire Protection Association]. Their study showed clearly that mechanical and electrical failures or malfunctions account for the majority of mobile equipment and vehicle fires – around 60 percent in the case of off-highway equipment. The study further concluded that the most common location for the outbreak of a fire – again in something like 60 percent of the cases – is in or around the engine compartment, the running gear or wheel areas.

In addition to fuel and the risk of fuel-line ruptures, there are any number of flammable liquids present throughout a piece of mobile equipment's engine compartment. Depending on the particular piece of equipment, these include oil, hydraulic, brake, automatic transmission and power steering fluids, plus combustible accumulated grease on the engine block, for which frayed or

damaged electrical wiring can easily provide the ignition source. Many of these fluids are pumped under high pressure near hot engine, transmission, braking and electrical components.

Additionally, the payload carried by some pieces of mobile equipment and the terrain in which some operate means that some of the combustible materials found in or around engine compartments are freight specific. These can include agricultural crops that, surprisingly perhaps, account for around 15 percent of the items first ignited in a fire, together with sawdust and wood chippings.

Solution Check List

The vast majority of these high risk areas are either in cabinets, compartments or enclosures or within what is often referred to as a "micro-environments". This is very significant in fire protection terms as it means that these high fire risk areas can be given dedicated and very effective fire protection. But to be a practical solution to the fire safety challenge in this type of mobile equipment, the system must have a number of characteristics. These can be summarized as:

- The solution should combine both fire detection and fire suppression in a single, integrated package.
- It should respond to a mobile equipment fire with proven 100 percent reliability.
- It has to deliver around-the-clock reliability, as this type of equipment is frequently in operation 24 hours a day, seven days a week.
- The system must provide unsupervised, automatic protection. The solution must not require manual intervention.
- The solution must have proven high immunity to false alarms if expensive stoppages and unnecessary suppression discharge is to be avoided.
- The system must be robustly engineered to contend with harsh conditions that can include severe vibration, dust, debris, salt water environments and airflow around the protected compartment.
- It must be able to withstand extreme temperatures and wide temperature variations.
- The system must stop a fire precisely where it breaks out, before it takes hold and spreads to engulf the entire piece of equipment.
- Finally, the solution should require no external power.

While several systems are marketed as being able to provide fire protection for mobile equipment, the majority fall short of these essential characteristics in various ways. For example, some are suppression-only systems that need to be linked to a detection system; conversely, others only detect a fire, and so need to be integrated with a suppression system. Both are unnecessarily expensive options.

Other options sometimes put forward require a power source, with the unavoidable possibility of failure that would render the system useless, while others fall down when it comes to their high incidence of false alarms, the considerable space and weight associated with suppression agent storage, the need to embark on extensive suppression agent clean-up after discharge, and the risk of agent discharge actually damaging sensitive electrical equipment or causing corrosion.

Proven Solution

The only system on the market that overcomes all of these challenges is an automatic tube-based system called Firetrace, which has already been adopted in the USA, Europe and the Middle East

to protect this type of mobile equipment and on-highway and off-highway vehicles. Indeed, such is its proven reliability that, despite there being over 150,000 Firetrace installations around the world, there has never been a single instance reported where a properly installed and maintained Firetrace system false alarmed or failed to suppress a fire. This reliability is underpinned by an array of international standards. Firetrace is the only UL [Underwriters Laboratories] listed, FM [Factory Mutual] approved and CE [Conformité Européene or European Conformity] marked tube-operated system in the world that is tested as an automatic fire detection and suppression system.

Firetrace systems have been successfully installed to protect the engine compartments of Liebherr and Gottwald cranes at SAQR Port at Ras al Khaimah in the United Arab Emirates. The decision to retro-fit fire detection and suppression followed a costly and disruptive fire. The installations proved so effective and reliable that Firetrace systems have now been installed in new Gottwald cranes at the port.

An equally challenging application was in Bulgaria, where Firetrace is now safeguarding heavy ore-moving crawler equipment at the Assarel-Medet JSC open-pit copper mine in the Sashtinska Sredna Gora Mountains. Winter temperatures can drop as low as –5°C, while summer temperatures can be as high as 28°C, plus the working environment is excessively heavily dust laden.

In the USA, Firetrace systems have been installed in Taylor Machine Works' THDC-955 five-high container stackers where, to ensure resistance to corrosive salt water spray and high pressure steam washes, the exposed Firetrace cylinders were additionally coated with Line-X polymer protective coating. Similar systems have also been installed in Mi-Jack Rail Stackers that are used for loading containers onto rolling stock.

Integrated Detection & Suppression

Firetrace is a linear pneumatic fire detection and suppression system that is not plagued by the major drawbacks and shortcomings of other technologies put forward for the protection of mobile equipment.

It is a self-contained system that, significantly, requires neither electricity nor external power; an intrinsically safe solution that is activated automatically around-the-clock, without the need for manual activation or monitoring, and requires virtually no maintenance. Firetrace comprises a cylinder containing a suppression agent – in most mobile equipment applications this is ABC dry chemical powder – that is attached to a purpose-designed proprietary Firetrace Detection Tubing. This leak-resistant polymer tubing is a linear pneumatic heat and flame detector that is designed to deliver the desired temperature-sensitive detection and delivery characteristics.

This Firetrace tubing is routed throughout the areas to be protected and, when the tubing is exposed to heat and radiant energy from a fire, it ruptures and instantly directs the suppression agent at the source of the fire.

While ABC dry chemical powder is commonly used for protecting engine compartments due to its ability to suppress Class A and Class B fires (Class B and Class C in Europe, Australasia and Asia) Firetrace systems are also available that use the latest clean agent technology, 3M Novec 1230 Fire Protection Fluid and DuPont FM-200. Both enable end users to embrace sustainability and minimal environmental impact; they are non-corrosive and non-conductive agents that are listed in appropriate codes and standards such as NFPA 2001:2012 (Standard on clean agent fire extinguishing systems) and BS EN 15004:2008 (Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance).

Scott Starr is Director of Marketing at Firetrace International

For further information, go to www.firetrace.com

Saturday, August 25, 2012 – Fire rises over the Amuay refinery near Punto Fijo, Venezuela. The huge explosion rocked Venezuela's largest oil refinery, killing 48 people and injuring dozens.

AP Photo/Ariana Cubillos

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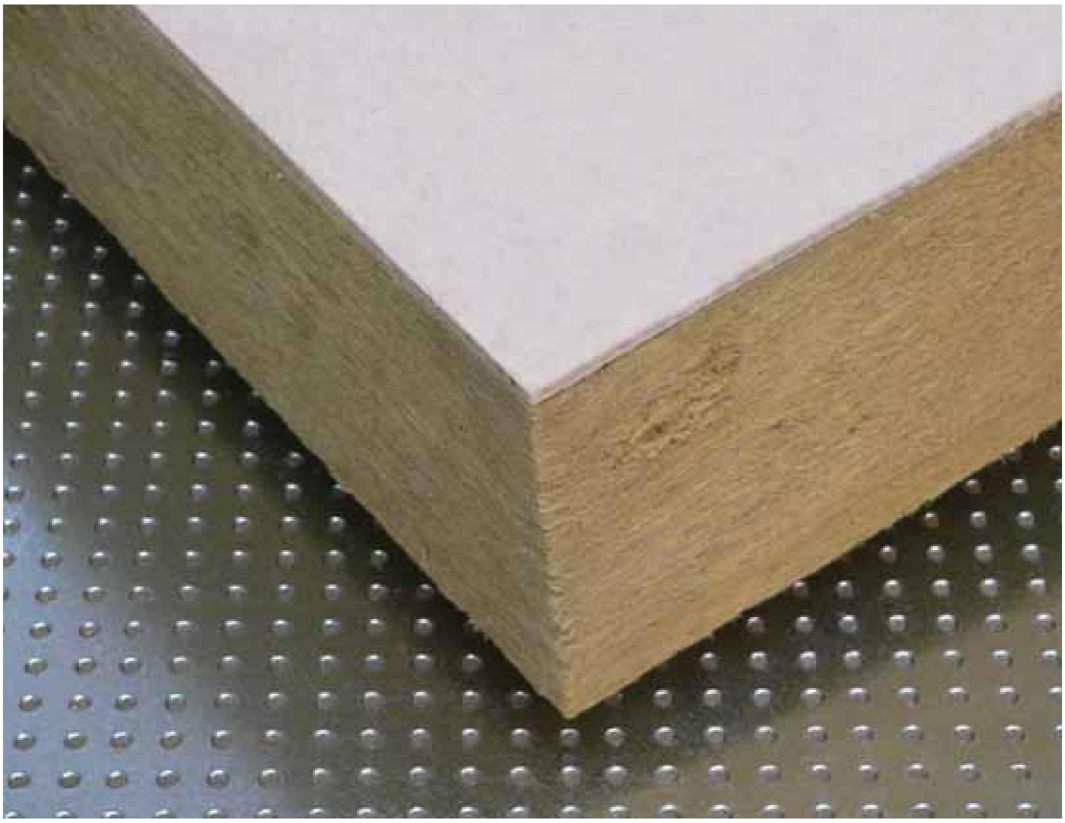
What Lies Behind t Protection Board?



Ian Cowley

Promat UK

Although the art of passive fire protection continues to develop at a rapid pace, the humble fire protection board still remains at the heart of an effective and reliable system. But, these boards are not as humble as one may think.

The practice of passive fire protection has evolved significantly over recent years, from its origins as an attempt to simply prevent a building being destroyed by a blaze. It has been developed to the point where it can now be highly effective in limiting a blaze, and the smoke and gasses it produces, to the point of origin.

As with any progress however, there has been a price to pay, particularly when it comes to specifying the humble building board that still lays at the heart of most fire protection systems. Where choosing the right board was once a simple task, there are now many considerations that must be weighed against each other as the specifier makes his or her way through the bewildering array of products on the market today.

The passive Approach

Building boards that insulate and protect against fire are a key element of any passive fire protection system. The UK Passive Fire Protection Federation (PFPF) describes how passive protection measures achieve their intended purpose: '*by raising the fire resistance of the structure, protecting the structure against the effects of fire, reducing fire spread through secondary ignition, limiting the movement of flame and smoke, and minimising the danger of fire-induced collapse or structural distortion*'. Although rather long-winded, this description clearly illustrates the types of role that a building board is expected to play within a wider passive fire protection system.

Today's fire protection building boards can be made from a variety of different materials such as calcium silicate, gypsum-based plasters, or specialised vermiculite compounds. Advances in modern manufacturing techniques mean that these can easily be combined with something such as stone wool to create a highly efficient and cost-effective board that protects against fire and heat,

Boards are also available in a wide range of thicknesses, which makes the process of creating the required degree of fire protection a reasonably straightforward task. Generally speaking they are ideal for most applications, including timber-framed buildings, floor constructions, suspended ceilings plus flat or pitched roofs. They can form seamless barriers that deliver up to 240-minute fire protection and can be used to protect many different load-bearing and non-load-bearing elements. Walls,

he Humble Fire

floors, beams, columns, stairs, balconies and walkways are all typical applications, and the boards can also be used to create escape routes and refuges to protect a building's inhabitants, so their performance must be totally reliable. Among the few types of application where they are not generally suitable are things such as cellular beams that have holes for service penetrations, where spray-applied fire protection is often the preferred choice.

Fire protection boards do however offer a clean, dry installation process. They are normally easy to cut, drill and shape and can be worked in the same way as timber products, with no special tools required. They can also create a neat and tidy finish and can be left undecorated, especially in parts of the building where they will not be on view. However the boards can also be decorated, which allows them to become part of an interior decoration scheme if required.

A Board with Character

There are numerous general board characteristics that need to be considered during the selection process, especially those that allow boards to resist warping and disintegration, even when wet. This last point can be particularly beneficial during the installation process, as a board that offers excellent dimensional stability in damp and humid conditions can be installed at an early stage, even before wet trades are completed or the building is weather-tight. A good degree of resistance to impact damage is also desirable in this situation for similar reasons.

The specific nature of the building will also have an influence on the type of board selected. For example, a board that can be used to create a genuinely seamless finish will offer great design flexibility – something which might be of special benefit to particular projects. Resistance to a very humid or corrosive atmosphere might also be required for some industrial applications, while a board with a hygienic biocidal surface finish that prevents the growth of mould and bacteria will probably be needed for a food processing, swimming pool or chemical manufacturing environment. Depending on the building's location and intended use, even such factors as resistance to attack by rodents and insects can have a bearing on specifying the correct board for the project in hand.

Performance you can Rely On?

When selecting the most appropriate type of board for a project, two of the main considerations that should be borne in mind are fire resistance and insulation performance. The board must obviously be able to resist the passage of flame, but it is equally critical that it can withstand the transfer of excessive heat that can lead to spontaneous combustion on the other side of the board to the fire.

For this reason it is essential to ensure that your boards have been properly tested and can be relied on to provide a high level of performance. Most countries have developed fire protection performance standards that support their own national building regulations, with many of these including reaction to fire tests – which reveal how a building board will become involved in the growth of fire at the point of origin – and fire resistance tests that show how a building board installed in a system will prevent a fire from travelling and causing the structural collapse of the building elements it is protecting.

Examine the Detail

Many manufacturers will include details of the specific fire test regimes used in their product literature, and these details should be comprehensive. Lesser boards, such as some of those currently being imported into the UK market for example, may claim to have the backing of fire test results, but these claims are often based on single or irrelevant tests and so do not provide anything like a comprehensive picture of the board's quality and ability.

Specifiers should not be afraid to interrogate the fire test results that are provided, and if they have any doubts or questions they should always speak directly to the manufacturer, who should be able to provide as much detail as they require. It is also worth remembering that insurance companies sometimes look for positive passive fire protection measures that adhere to certain standards before they will insure a building, so this may be another factor to consider.

Great care must be taken here. Although literature relating to the board in question may say that is can provide up to four hours fire protection, there

are many factors that can affect this performance and result in boards being installed that are inadequate for the particular application in question.

One such factor that will influence a board's ability to reproduce tested performance is the way in which it interfaces with other materials. A board may be installed adjacent to any number of structural elements such as steelwork, or other fire protection products like intumescent paints and spray-applied coatings. It is important to understand exactly how the board will react during a fire, and also the way in which the adjacent materials will respond in terms of expanding, shrinking or transferring heat. A reputable board manufacturer will normally have a database of interface test results that can be used to make assessments on the likely reactions of the interfacing materials in a fire, enabling them to provide reliable installation guidelines that will help ensure the maximum levels of protection.

Third Party Reassurance

Third-party product certification schemes offer a good source of reassurance here, as these schemes require certificated products to be assessed regularly to ensure that they are still manufactured to the specification used in the original fire test, and that nothing has changed which could affect their performance. However it is important to remember that these types of third-party certifications are usually application-specific. Care must be taken to use the certified product only in a way that will allow it to reproduce the integrity and insulation performance achieved in the fire test.

Some board manufacturers are also happy to support their customers by making site visits. Visits made early in a project can make a huge contribution to the design of a fire protection system and ensure that it is as effective as possible, while visits made during and after the installation phase can make sure that the on-site work is carried out to a standard that will allow the fire protection materials to function effectively and reliably.

Product Training

The majority of board manufacturers that can provide this service, and offer third-party certified products, will also normally be able to advise on specialist contractors with suitable training on the installation of their products.

The importance of this training cannot be overstated. Although all regulations, codes and guidelines might have been adhered to when boards were used to design the original fire compartmentation system, changes over the life of the building will almost certainly result in fire-rated floors or walls being perforated to allow new services to pass though. Most specifications that cover the reinstatement of a fire barrier only give the recommended fire integrity and insulation that is required and this opens the way for inferior solutions to be used.

Patressing is a practice of particular concern here, where plasterboard off-cuts are used to either reduce the size of a hole so that fire-stopping mastic can be used to finally seal it, or where board off-cuts are simply glued into place around the penetration with a fire-rated sealant The better board manufacturers make recommendations of how patressing with their products should be approached, and any contractor who has received training from these manufacturers should know exactly how to create the most effective solution for the project in question.

Certified Reassurance

Using a third-party certified installer will also add another layer of reassurance to the situation. To gain their certification, such an installer will have had to demonstrate a high degree of expertise and competence in the use of fire-protection products and will also usually have had their work certificated by an external certification authority. If there is any doubt however, the manufacturer is always the best port of call for reliable advice.

Of course building boards alone cannot protect against fire. They need to form part of a wider protection system that might also include intumescent coatings, penetration seals and a host of other measures that will maintain proper compartmentation and structural stability. For this reason it is often best to source your building boards from a manufacturer who can also provide a wide range of other passive fire protection measures. This ensures that the various elements will be compatible with each other and that they will be as tightly integrated as possible. It is also far simpler to source a complete passive fire protection system if you only have to deal with one supplier, especially if that supplier can provide all the technical support and guidance you might need as part of the specification process.

So, the humble board may not be as humble as you first thought! IFP

Ian Cowley is Strategic Business Development Manager at Promat UK

For further information, go to www.promat.co.uk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warning signals

Pilkington Pyroclear used in a contemporary office building

Risk, Reliability and Product Profile

New Perspectives from Developments in Fire-Resistant Glass

Mike Wood

NSG Group

Changes to building design practice place an increasing importance on the way manufacturers and fire engineers consider each other's needs and requirements.

One of the most significant developments in fire safety is the introduction of risk-based techniques. In building design this includes fire safety engineering; especially for often complex, multifunctional, commercial buildings. Given the prominent use of glass in large quantities and a wide variety of sizes in buildings of this type, the introduction of fire safety engineering requires special consideration in light of changes to fire safety.

The risked-based perspective requires a different outlook compared to the more traditional, prescriptive, approach to fire safety. Important questions arise as a result and prime among these are the implications a risk-based approach pose for product performance under realistic fire conditions. The validity of the assumptions made by fire safety engineers regarding the performance of glass in fire is also key. Product developments in turn can lead to new knowledge and insights, introducing alternative perspectives that should be fed back into the engineered design process. It is also important that decisions in risks assessment are, properly informed as much as possible by the provision of appropriate and applicable knowledge as it becomes available. Product expertise rests, in the main, with manufacturers. They clearly have a major responsibility, as a result, to be open about

Pilkington Pyrostop used in Ireland's national marine institute

product limits and to explain product risk and application profiles. Engineers for their part need to respond.

The case for clear dialogue between the two could not be stronger. Yet the interchange is limited. Fire safety engineers are accustomed to thinking in terms of building and occupancy risk profiles relative to a defined, expected fire scenario (the "design fire"). It is quite possible within that model approach to also think in terms of product risk profile. But that, surprisingly, is not yet established practice. A review of the risk profiles of glass and fire-resistant glass types, as examples puts this in context.

Glass Characteristics in Fire

The risks of using standard glass products – coated, annealed, double glazed units, safety and security laminated, and toughened safety glass – are well established. Glass is transparent and lets high levels of heat through, which can cause life-threatening highly serious burns, as well as secondary ignition on the non-fire side. This can lead to the additional risk of secondary fire and smoke. Glass is also notoriously susceptible to thermal shock and stress; it readily cracks under modest heat, sufficient to boil water. Cracks readily spread, leaving the glass pane a patchwork of shattered pieces.

One of the most difficult glass characteristics for engineers is that there is no single failure strength value for glass. Limit values can be determined as guides, but that does not necessarily allow determination with certainty of what may happen to any particular pane of glass. The properties of glass do not lend themselves to ready computation in the same way as other materials, such as structural steel. Because of the fundamental nature of glass, strength, and therefore fracture, is a probability effect requiring statistical treatment. The surface condition of the glass is a critical influencing factor, which naturally varies due to circumstance and the history of the particular piece of glass under consideration. Abrasions or scratches after processing, handling, transport, installation and during potentially long use in situ, can readily influence the fracture sensitivity profile quite markedly from that which applies to glass fresh off the production line.

This is particularly significant for thermally toughened safety glass that hough significantly stronger than annealed glass is far from immune to failure in fire conditions. Toughened glass is fundamentally vulnerable to intense stresses generated in a fire, and the likelihood of uneven exposure producing a complex anisotropic stress pattern means susceptibility to failure under quite modest, localised fire exposure. If failure occurs, then toughened glass disintegrates into a pile of small pieces. This is exactly what it is designed to do as an impact safety product. In developed fires this becomes a critical weakness. Even carefully produced standard toughened glass has a specific vulnerability to fire with an "unacceptable" probability of failure. It is common in fire tests for failure to occur after only few minutes. Failure in tests is unsurprisingly far more common than a pass. This risk also applies to gel fire-resistant glass types which incorporate toughened glass as part of their design. Mitigating these risks and lowering the failure probability to tolerable levels in product design requires special care, knowledge and attention.

Improvements can be made through attention to detail. The NSG Group has developed a product, Pilkington Pyroclear that is in effect a new class of modified toughened fire-resistant glass, setting new standards in performance. Pilkington Pyroclear is the result of more than ten years of dedicated research on the factors influencing glass fracture in fire. This has led to proprietary improvements that provide a much improved risk profile compared with other types of modified fire-resistant glass. While it is a new product to the UK, it has a successful track record of use over several years in Japan and more recently continental Europe.

The product is based on a new specification and cutting edge technology developed in Japan. Its manufacture is based on controls and quality targets closer to those used in the high pressure automotive glazing industry than in the construction sector. During the development phase, 50 consecutive successful tests were completed in timber frames. This is an unparalleled level of success for a product of this type. Timber frames create more demanding framing conditions than applies to metal systems, because of higher thermal stresses generated under fire conditions.

Organic Interlayers

Safety, security, acoustic and blast-resistant laminated products are based on a combination of glass and plastic interlayers. Although the organic layers vary they are all essentially of one characteristic where fire is concerned. They are carbon based, containing low melting components which mean easy liquid formation, ready ignition and fierce flaming. When exposed to direct flame, as likely when the covering glass cracks, the interlayers burn easily and give off copious volumes of potentially toxic smoke depending on oxygen

levels. They are anything but, reliable barriers against fire.

It is also possible to utilise epoxy plastic interlayers of slightly different compositions, containing flame retardants, as a type of fire-resistant laminated glass. It is, however, important for designers, specifiers and users, to know that the interlayer has to lose its volatile organic components to create the carbonised char that forms the basis of its fire-resistant function. That potentially means the risk of volumes of smoke and fume under developed fire conditions and, if conditions determine major flaming, before relative stability sets in. Yet by this stage the glass could also be extensively cracked and opened up by the fumes coming off the interlayer. Developers of that system will be aware of this sensitivity and will no doubt take whatever measures they can to mitigate the risk. But the result could be that the application profile of the glass is very much limited (concerning plate sizes and glazing assemblies for example) and that the fire conditions in which the product can be used without raising risks are somewhat restricted.

Fire-resistant Glass

It is easy to define what an ideal fire-resistant glass must do. Firstly, it has to hold together as a barrier impenetrable to flame and the products of combustion, avoiding catastrophic failure. Secondly, the glass should attenuate transmitted heat to low tolerable levels – that is, a maximum of 2.5kW/square metre heat intensity at a distance of one metre – particularly if likely to be exposed for extended periods of time beyond 30 minutes. That criterion in effect means insulation levels of performance, as defined in standard tests. Thirdly, conducted heat should be low to avoid high surface temperatures which could give rise to high breathable air temperatures on the non-fire side. Of course, the glass itself should not burn or smoke on the non-fire side.

Those core properties are easy to define, but very difficult to achieve. The key for a fire-resistant glass is of course, to carry out its function consistently and reliably. There are still quite a few proprietary secrets in developing appropriate technologies and in producing robust and fit-for-purpose fire-resistant glass products to achieve that aim with confidence. The overall objective, of whatever approach is taken, should be to minimise risks; and in that process to define the applicable application profile which accordingly applies to the product. This will be determined by size capability, range of assembly and system options, also the failure and deterioration limits under fire conditions. Most importantly, the product risk profile will give clear indications on what sort of natural fire conditions will be most appropriate for the glass to perform at its best (that is, with the lowest acceptable risk).

Mode of Failure

No two fire-resistant glass products can truly be said to be alike, even though they may nominally be based on the same or, similar generic glass and processing technology. There is a variety of technologies on offer, attitudes and policies vary from manufacturer to manufacturer, proprietary improvements may apply, and details of manufacturing control in practice, certainly differ according to individual control and quality systems.

Product risk profiles fit products individually, as an inherent and distinctive characteristic. Key questions to ask relate to the mechanism and mode of failure. All products deteriorate in fire. Some, however, have a catastrophic failure characteristic, which means that prediction and control are more difficult to manage. The risk profile should reflect this; which in turn leads to the scope of application profile (including optimum fire conditions). The target should be to develop products and use technologies that have a stable deterioration mechanism, one that is gradual and progressive – and therefore one that is inherently predictable and controllable. It is those products that are needed in the face of uncertainty – where risks are not entirely predictable and controllable; when the occupancy profile is higher risk, or when there is a possibility of extended or intense fire exposure.

The classic stable mode of failure is illustrated by traditional wired glass: the glass cracks but the embedded wire mesh holds the pane together as a resilient basic integrity glass until temperatures rise to the flow point of glass. Other stable situations are produced by compositions with low or zero expansion (e.g. borosilicate and ceramic glass). But all basic integrity glass types which remain transparent (i.e. without an effective intumescent interlayer), suffer from potentially dangerous transmitted heat levels. Attenuating some of the radiant heat is not enough. For an effective heat shield, an element of insulation is required in addition to integrity.

One of the best examples of stable behaviour in fire is provided by Pilkington Pyrostop – insulation and integrity, of up to three hours – and Pilkington Pyrodur – primarily integrity based, but capable of 15 minutes insulation performance in tests. Both depend on the use of glassy, inorganic water glass as single or multiple interlayers. On exposure to fire the interlayer readily turns opaque, blocks out radiant heat and intumesces, producing a foam layer that reduces transmitted heat to low tolerable levels. The particular advantage is that the interlayer is compatible with the annealed glass panes used in the laminate to form a resilient and robust bonded structure. The Pilkington Pyrostop 60-minute classed product for example, has a successful track record in large fire incidents. In a notable fire at Center Parcs, Elveden Forest, UK, Pilkington Pyrostop survived extended exposure under fierce fire conditions for more than seven hours and effectively halted spread of the fire in its tracks.

Continuous Improvement

Fire safety engineering undoubtedly has a role in fire safety design. That is complementing rather than superseding, prescriptive approaches. But there are major implications concerning assumptions on the fire behaviour of materials and products. That applies especially to glass in fire. Knowledge needs to be improved and understanding requires development. The first step is to accept and acknowledge the gaps. The second is to take steps in making improvements. That means involving manufacturers and achieving a much better appreciation of glass technology and product risk profiles. But the necessary dialogue has hardly begun. IFP

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For further information, go to www.pilkington.co.uk/fire

Water Mist System East Recognition

The new Carpet Museum in Mashhad, Iran

Rüdiger Kopp

Fogtec

Water mist firefighting systems have been around in the Middle East for the past 15 to 20 years. However, it is only recently that water mist technology has achieved broad recognition in most Middle East countries, leading to it being specified in numerous prominent projects.

Due to the nature of water mist and the variety of different technologies to generate water mist, there are no prescriptive standards as there are for conventional fire fighting systems such as water sprinklers or gaseous extinguishing systems. All published water mist standards have a performance based approach and require independent full scale fire tests as the design basis.

For most applications, no common fire test protocols have existed until a few years ago, which made it difficult for authorities having jurisdiction, mostly being the civil defence departments in Middle East counties, to decide whether water mist is suitable to be applied for protection of a certain fire risk.

This situation has changed in recent years and water mist standards such as CEN TS 14972 and FM 5560 today clearly specify full scale fire test scenarios to be passed for system acceptance and approval for a number of industrial and ordinary hazard risks.

For applications where no detailed fire test scenarios are defined in the existing standards, the CEN TS 14972 standard provides a clear procedure to develop representative fire test scenario for the respective fire risk. This approach is today followed by all renowned fire research bodies and approval bodies certifying water mist technology.

Civil defence departments in the Middle East counties have, as a common practice, defined and published listings of internationally accredited fire test laboratories and certification bodies that they accept and approve for all kind of fire protection systems. The number of listed institutions for water mist is still limited, but constantly increasing due to the growing knowledge and awareness of water mist systems by these departments. This has

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The Sultan Qaboos University Library in Oman

made the Middle East water mist market more transparent and generally prevents doubtable protection concepts, and doubtable water mist systems specifications and installations in the Middle East region.

So, it must be stressed that independent full scale fire tests for each individual application and system equipment are essential for reliable and safe use of water mist technology.

Water Mist Market Development in the Middle East

Where initially in the 1990s in the Middle East region water mist technology was seen as a Halon alternative firefighting agent for various industrial and machinery fire risks, today the majority of projects where water mist is specified fall into areas traditionally being protected by conventional sprinkler systems. Due to the broad recognition of the technical benefits of water mist systems for ordinary hazard risks in Europe, these have been introduced in numerous high profile projects throughout the Middle East region.

System advantages of water mist systems include substantially less water consumption, combined with higher cooling effect when compared to conventional sprinkler systems. Upon system activation, less consequential water damages will occur compared to a sprinkler activation, which has a strong impact on clean-up costs, business and operational interruptions, particularly in hotels, libraries and museums. In some cases the high cooling effect of water mist systems allow for a reduction of certain fire protection measures, for example, fire resistant glass facades or exposed steel structures.

The space saving pipe installation due to small pipe sizes of 12mm to a maximum of 60mm for main risers is providing architects with greater flexibility when designing modern buildings. In a number of projects, the stainless steel pipework of water mist systems with exposed pipes at concrete ceilings has become an integral part of the architectural aesthetics of the building. Also a smaller space requirement for water storage and pumping equipment is a strong argument in favour of water mist technology. The space saved can be utilised for commercial activities, which is a common factor when considering life-cycle costs and comparing water mist systems with alternative technology solutions.

Operators of buildings containing valuable items and documents, such as in libraries and museums, have been the first to employ water mist technology in the Middle East region. This includes the Sultan Qaboos University library in Oman and the library in the University of Balamand in Lebanon, as well as the new carpet museum in Mashhad in Iran.

Even if the focus today is on ordinary hazard risks, fire protection challenges found in large industrial projects also make use of water mist technology, including in the power generation and power distribution industries and in infrastructure developments such as metro stations. Typical applications can be found in cable tunnels,

Mecca Royal Clock Tower in Saudi Arabia

transformers, generators and control rooms.

The almost three dimensional spread of water mist, along with its high cooling effect and hydraulic flexibility when designing extended pipe systems in widely spread installations have motivated fire consultants to specify water mist for these applications in prestigious development projects in various Middle East countries. Among these is the protection of large underground cable tunnels that provide power supply to the impressive real estate developments in Dubai, the protection of technical areas along the metro

line in Mecca in Saudi Arabia, and switchboard areas at Telecom Egypt in Cairo.

Middle East Case Study

Located adjacent to the holy mosque Masjid al Haram with the Kaaba, the Mecca Royal Clock Tower is the second tallest building in the world with 120 floors and an overall height of 601 metres. The building was completed in 2012 and is part of the King Abdul Aziz Endowment Project and houses a luxury hotel, the 46 metre diameter Royal Clock, which is visible for 25 kilometres. From there daily prayers are offered to the Muslim world.

Initially being to have a height of 485 metres, the building was extended during its construction to the final height of 601 metres. Due to this extension, the lower 400 metres of the building are built in reinforced concrete structure and the upper 200 metres in steel. The upper part of the building, containing the royal clock and large displays, is covered by lightweight claddings and is equipped with more than two million LEDs and 21,000 flashlights.

Weight restrictions and the elevated fire risk within the upper 200 metres of the tower represented a challenge to the fire protection concept and necessitated special fire protection measures. Whereas the lower 400 metres of the building housing the luxury hotel is protected by a conventional sprinkler system, the sprinkler system could not be extended to protect the Lunar Observation Centre, the Islamic Museum and the clock itself, all of which occupy the upper 200 metres of the building.

Due to the high cooling ability and low water consumption of high pressure water mist technology, it was chosen by the architect and the fire consultants to be the best possible solution to protect the challenging steel construction part of this outstanding and prestigious building. Beside ordinary hazard fire tests for OH1 and OH3 fire risks, additional special full scale fire tests were independently conducted to verify the efficiency on the water mist system in protecting the exhibition and museum spaces that have up to 12-metre ceiling heights.

All public spaces of the Lunar Observation Centre and Islamic Museum and even the semi-public areas up to and including the top of the tower have been protected with a wet system using 2250 glass-bulb-activated nozzles. The machinery areas and cable areas are equipped with a total of 740 nozzles forming a deluge system. The system has been zoned into individual activation areas by means of 156 section valves. This particularly relates to the machinery spaces behind the clock, the LED screens along the perimeter of the tower below the clock, and to the illuminated half-moon at the top of the building.

For manual fire fighting intervention, 83 high pressure water mist wall cabinets have been positioned around the upper 200 metres of the tower. The water mist fire fighting guns provide effective extinguishing equipment with the lowest possible water consumption.

This is a typical example of the challenges for which water mist technology offers significant advantages over other conventional fire protection systems.

Outlook

At this year's Intersec exhibition in Dubai in January – the largest fire protection venue for the Middle East region – the increasing interest and acceptance of water mist technology was apparent by the positive feedback of water mist system exhibitors as well as feedback from the IWMA (International Water Mist Association) educational seminar, which was held at the convention centre during Intersec.

So, water mist has its firm place in the Middle East fire protection market, particularly for water sensitive areas and buildings that have so far been protected only by fire detection systems. These applications represent the most rapid developing application field for water mist technology thanks to the numerous installation and safety benefits. Beside libraries and museums, applications such as high rise buildings, hospitals, laboratories and executive-style hotels are identified as being particularly appropriate water mist applications. IFP

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Evacuation Modell Human Behaviour

Evacuation of buildings can be analysed in different ways. Approved Document B (ADB) which provides guidance on meeting the requirements of the England and Wales Building Regulations with regard to fire safety, specifies width of exit routes such that the time required for occupants to flow out of a prescriptively designed enclosure, containing a maximum design population is 150s (2.5 minutes). Sometimes, a more flexible approach, such as that given in BS 9999 is also used for the evacuation assessment in buildings. Techniques offered in these guidance documents are generally straightforward and simple to use and suitable for most buildings.

Ken Seow

Lawrence Webster Forrest

However, in certain situations for example, complex or innovative building designs, where the scope of traditional prescriptive design guidance cannot readily be applied it is necessary to consider a performance based design by developing a time based comparison of the time available for occupants to escape (Available Safe Escape Time – ASET) and the escape time (Required Safe Escape Time – RSET) to ensure life safety in the building. In this instance, evacuation models, based on engineering and computational tools, have been used to estimate the time taken to evacuate a building. While hand calculations as recommended in PD7974 remain a possibility to carry out such assessment, it can often be difficult where large numbers are expected or where more complex flow characteristics need to be considered. Also, evacuation models can offer more visual and easily understandable graphical outputs.

Lawrence Webster Forrest (LWF) has recently undertaken an evacuation modelling exercise for a complex public assembly building in London. From the modelling exercise it is identified that there are some limitations of the model and it does not necessarily reflect the variable nature of human reaction in a fire. This bulletin will discuss the key considerations of human behaviour so that a more comprehensive and predictive model can be developed for a building's fire evacuation.

In certain complex or innovative building designs, where the scope of traditional prescriptive design guidance cannot readily be applied it is necessary to consider a performance based design by developing a time-based comparison of the time available for occupants to escape and the escape time.

Understanding of Fire Precautions and Management Systems in Place

The results of evacuation models could be misinterpreted if the fire precautions and management systems for a complex public building are not fully understood. A fire alarm sounds in a public assembly building and everyone reacts promptly, only using designated stairways and exits, and making their way outside in a brisk but orderly manner. That is how an evacuation model might simulate a fire situation. But it does not consider what is termed "exit choice behaviour" – the different exits that people will choose to leave by, often because they are also the entrances and routes by which they arrive. This is especially true where the occupants are unfamiliar with the layout in public buildings. In a real evacuation scenario this can lead to congestion in the main entrance/exits and queuing inside buildings at those discharge points. As a result effective means of escape can be heavily dependent on robust management of the public by member of staff. All available alternative exits must be used to allow the quickest possible evacuation. If managed evacuation is not possible, the design should be examined and the exit choice ratio for evacuating occupants should be justified. A number of cases should be run to examine the effect of exit choice on evacuation time.

The simulation of the reaction of occupants in large public buildings which adopts a progressive evacuation should also be considered. Although it is possible to integrate fire alarm cause and effect functions into the evacuation models such that only the alarm zone activated will evacuate and people in the adjacent safe zones do not enter the fire area the actual human behaviour in a fire situation may not reflect this. The psychology is that a fire alarm in itself is not necessarily regarded as an immediate call to action. This is particularly true where the alarm may have sounded, but no immediate threat is apparent or where occupants may have other activities such as making a purchase. However, even when the alarm is taken seriously, it is also a source of confusion, because the alarm is simply a loud noise. People often act inappropriately but rarely panic or behave irrationally. Such

ing – Factor in

behaviour, to a large extent, is due to the fact that information initially available to people regarding the possible existence of a fire and its size and location is often ambiguous or inadequate.

In order to ensure an effective evacuation it is paramount to rely on the trained members of staff to manage the evacuation by motivating and guiding the evacuation of members of the public. In some cases, voice alarm can be used in conjunction with a managed evacuation to ensure the robustness of an evacuation strategy of public buildings. Voice alarm systems are largely becoming a more acceptable mode of informing occupants of a fire occurrence in modern buildings. Large premises which are designed to cater mainly for the general public will benefit greatly from a voice alarm system where voice messages can convey a greater amount of information to the occupants.

To ensure an effective evacuation it is paramount to rely on trained members of staff to manage the evacuation by motivating and guiding the evacuation of members of the public. In some cases, voice alarm can be used in conjunction with a managed evacuation.

Factor in Human Behaviour

Defining human behaviour in evacuation models for public buildings is not as simple as just to adjust the occupant travel speeds or change the shape or size of each evacuee. From our experience, the followings are some examples of human behaviours that should be considered when simulating an evacuation model in public buildings.

Final Exit of Evacuation Models

In most evacuation models, evacuation stops at the external exits from buildings, however; for some evacuation scenarios, people may still require to travel for significant distances along external routes before reaching a point from which they can leave the premises. Many of the available escape routes discharge to the external space which can essentially be considered as external corridors and the management of people in these areas must also be considered in the event of a large scale evacuation. Congestion in the external routes should be assessed to determine whether there are extensive queuing times in some locations, particularly where merging flows occur at the external routes and external exits from buildings. In addition, the scenarios such as people stopping at exits due to inclement weather should also be examined as this could reduce the flow of occupants in an evacuation.

People Re-enter the Building to Collect their Belongings

Based on the interview with the senior management team of a complex public assembly building in London, we identified that one problem faced by staff was encountered where people wished to re-enter the building to recover items from the cloakroom in an evacuation. Again this behaviour can cause delay and congestion at exit points and can be difficult to manage for staff. The impact of such behaviour is very difficult to model.

Disabled Evacuation

Evacuation models do not take the behaviour of disabled evacuees into account. An extensive evacuation time may occur in the event of evacuating a large group of people with disabilities in buildings. This is particularly true when there are a group of people with conditions such as dyslexia, dyspraxia or autism visiting a public building such as a museum. These people may not be aware of their impairment. Some of them may present unpredictable behaviour (including violent behaviour), which may impede staff in an emergency. To overcome the limitation of evacuation models regarding disable evacuation, designers should show a level of design redundancy which provides a factor of safety in the models.

Conclusions

The lack of suitable experimental data to validate large evacuation model of public spaces presents a challenge to evacuation modellers. Most evacuation experiments are designed and conducted for practical purposes and not necessarily to support the development of evacuation models. Inevitably, certain assumptions are required to be made based upon the understanding of the fire precautions and management systems in place. Many of the assumptions made are associated with the building's reliance on a managed evacuation and the rapid response of staff. Therefore it is important to note that where effective evacuation management cannot be achieved this may lead to extended evacuation times beyond those determined by the evacuation models.

Evacuation models can only take us so far in designing safety. Apart from implementing effective evacuation management, evacuation modellers should try to understand human behaviour in an emergency situation, particularly the factors that have been discussed in this bulletin to influence the decision-making processes. By understanding those factors and processes, an evacuation modeller can then develop a more comprehensive and predictive evacuation model. IFP

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Stadium Fire Safe

Lee Coates

Wrightstyle

It has been called "codifying by catastrophe" – how fire and other safety regulations have often come about because of tragedy.

In stadium design, the most awful example in the UK is the football disaster, which claimed the lives of 96 Liverpool fans in 1989. The so-called Hillsborough Disaster is testament to how poor crowd management and police control can so easily end in tragedy. The subsequent Taylor Report led to radical change, and the much safer stadiums we see today.

However, the real tragedy is that radical change had not been enacted sooner, for example, following the Ibrox Stadium disaster in Scotland in 1971, when 66 Glasgow Rangers fans were killed and over 200 injured in a crush on a stairway; or again at Ibrox, when a wooden terrace collapsed during an international game in 1902 killing 26 people.

Nowadays, major stadiums have crowd safety as their first design prerequisite; from entrances and exits that can cope with large numbers of patrons, to major incident plans (MIPs) to deal with any eventuality. Not least, modern stadiums are built with masses of concrete, steel and fire-rated glass to minimise the risks posed by fire.

But that too has come about because of tragedy, the worst fire disaster in the history of English football: the Bradford City fire in 1985 which killed 56 and injured some 265. Most likely caused by a dropped cigarette or match falling into a void area beneath one of the ground's stands, it soon engulfed the whole structure, including the roof. Worse, people had to break down locked exits to escape. The subsequent Popplewell Report introduced new safety legislation for sports grounds across the country. However, while modern stadiums are very safe, fires do still occur. Towards the end of last year a potentially serious fire occurred at Arsenal's Emirates Stadium in north London. It was took 20 firefighters to bring it under control.

The principal legislation relating to fire in major stadiums in the UK is the Regulatory Reform (Fire Safety) Order 2005. Under it, the club must plan, organise, control, monitor and review the necessary preventive and protective measures and record these arrangements in writing. In Scotland, the regulations are the Fire (Scotland) Act 2005, as amended, and the Fire Safety (Scotland) Regulations 2006.

UEFA (Union of European Football Associations) also offers guidance, making clear that "major lessons have been learned from the fire-related

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stadium disasters of the past." It insists upon active measures, such as extinguishers and sprinkler systems and passive measures such as fire compartmentation and fire doors. It is these passive measures, with independent testing against both fire and smoke that has proved a decisive factor, underlining the highly-specialist nature and international context of the steel glazing market.

The main lesson for designers is not simply to build-in passive and active fire systems, but to look at the whole stadium or building's capacity to withstand a fire. For the glazed components, that should mean analysing the level of containment the glass will provide and its compatibility with its framing systems. Those levels of containment are absolutely vital in a stadium, with very large numbers of people in a restricted area and who, in the event of a fire, may not always follow proper evacuation procedures. Evacuation models, based on engineering and computational tools, do not necessarily reflect the variable nature of human reaction.

Computer modelling and human behaviour diverge the moment the fire alarm sounds. The fire safety designers may assume that patrons will immediately head for a designated fire exit. However, human psychology is likely to delay any response because many people will assume it is a false alarm, or wait for further instruction from someone in a position of authority.

Further complicating matters is that people will generally finish what they are doing. If they are on a concourse buying food, they will often complete that purchase before deciding whether or not to evacuate. The most compelling example of this, although not stadium-related, was during the Kings Cross railway station fire in London in 1987, which killed 31 people.

In that tragedy, many passengers stepped over fire hoses to reach elevators taking them underground for their trains. That is what they were at Kings Cross to do, and a seemingly-innocuous fire was not going to stop them. In the retail sector, research suggests that people would rather first go to the check-out to purchase goods rather than immediately evacuate the building. More specific to stadiums, patrons will often seek to reunite with family members or friends. For example, if one family member is away from his or her seat when an alarm sounds – perhaps buying food on a concourse – they will often go back to their seat to find others in their party before making any decision to evacuate.

It adds up to a delayed flight time that the stadium's design and evacuation procedures must address. In buildings research, as much as two-thirds of the time it takes people to exit a building after an alarm is start-up time – time wasted in looking for more information, or not taking the alarm seriously.

Stadiums do, of course, have the advantage of having PA systems and a scoreboard on which information can be posted. However, human psychology is also at work, and the passive fire measures employed in the stadium's design must also factor in a delayed evacuation response. That is why modern steel glazing systems are so important, either for the exterior envelope of the stadium or for internal screens and fire doors. With advanced glazing systems able to provide up to 120 minutes of protection against the spread of fire, smoke or toxic gases, they have become an integral part of modern stadium design, giving people more than enough time to evacuate and protecting escape routes along the way. Those escape routes become more significant for the elderly, infirm or disabled who will typically need more time to evacuate.

However, one word of caution. In many instances, untested combinations of glass and frame are still being specified separately, despite the fact that, in a fire situation, the glass will only be as good as its framing system, and vice versa. Insisting on tested, and therefore proven, compatibility, and specifying it as a requirement of the tendering process, should be a matter of course.

Stadium design has come a long way in the past few decades, driven by new regulations to deliver a new generation of safer stadiums. But it is also a tragedy that it has taken catastrophe to make it happen. IFP

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For further information, go to www. wrightstyle.co.uk

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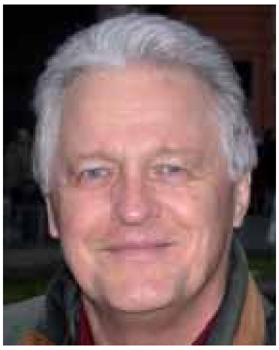
- Engineering support



Graham Collins

Email: graham.collins@mdmpublishing.com

Deeds not Words

In 1941, in his famous "Give us the tools, and we will finish the job" speech to the British parliament, the country's wartime prime minister, Winston Churchill, made much of the then recent successes on the battle fields, highlighting the wisdom of "deeds not words" when endeavouring to persuade the United States of America to provide material support for the country's war effort. That he ultimately succeeded in this endeavour is now well-read history.

This quotation came to mind when recently reading again about the tragic nightclub fire in Brazil that cut short the lives of 241 young men and women and injured a further 600. "Give us the tools, and we will finish the job" is a theme well worth pondering, particularly at a time when the International Firex exhibition is about to be held in the UK followed shortly after by the NFPA Conference in the USA. Both events will undoubtedly be showcasing the latest and best available technology to safeguard lives and protect assets from the ravages of fire.

So, what is the link between Churchill's galvanising wartime rhetoric and fire safety today? In recent years the global fire protection industry has, undeniably, made major strides in providing ever more reliable and versatile detection, alarm and suppression solutions. Sadly though, needless deaths are still occurring with depressing frequency around the world. The same could be said for the growing number of regulations around the world that today place the onus for ensuring fire safety clearly on the shoulders of business owners and building occupiers. How frequently have we read of instances where these regulations have been ignored – invariably to maximise profits – with dire and tragic consequences.

The harsh reality of the situation faced in many parts of the world is that the "tools" – fire protection products, systems, fire safety regulations and procedures – are already available. What now we have to do is make sure that the fire safety job is completed, and the only way we will do this is by banishing, once and for all time, any misguided notion that fire safety responsibility ends with the installation of a detection and alarm system, or that responsibility for ensuring that laid-down fire protection measures and protocols can be ignored at will.

It is not as though the Brazilian fire was an isolated incident or that nightclubs are the only buildings at risk. While, in the editorial in the previous edition of *International Fire Protection* I catalogued just a few of the major entertainment venue fires over the past decade or so, instances where reckless disregard for public or employee safety can be found in just about every type of building.

So the focus needs to be on enforcement; clearly there are building owners and occupiers that are prepared to put lives at risk. It is surely only right that those deemed to have been responsible for the Brazilian nightclub fire that took so many lives are now being held to account for their actions or lack of action. However, how much better it would have been if the same energy, the same commitment and diligence had gone into ensuring that fire safety at the premises and evacuation arrangements complied fully with the country's legislation.

Standards, codes of practice and regulations are relegated to being merely words if they are not enforced. It is not as if the solutions do not exist, that requirements are not clear, or that guidance is not available. It is all about putting the effort and resources into making it happen.

As Churchill so succinctly put it: "Deeds not Words". IFP

The only way to get the fire safety job is completed is by banishing any misguided notion that fire safety responsibility ends with the installation of a detection and alarm system, or that responsibility for ensuring that laid-down fire protection measures and protocols can be ignored at will.

Educated Response

C-TEC's ZFP four-loop touch-screen-controlled analogue fire alarm control panels have been installed at a pioneering specialist education facility in Manchester in the UK, Trust's Bridge College, an independent college for students aged 16 to 25 years with disabilities, complex needs and autism.

All devices installed on a system are displayed clearly on the panel's touch-screen interface. So, if the panel identifies a faulty device, it is immediately clear which one it is. The interface is very user-friendly; the scroll up, scroll down options and on-screen keyboard make installation and programming particularly simple and straightforward.

Situated in the entrance area, the ZFP provides total protection at the new £6.9m purpose-built college. The panel is linked to an array of devices including 150 Apollo smoke and heat detectors and 90 C-TEC manufactured addressable loop sounder/beacons located throughout the site.

The fire alarm system at the college has been programmed as a simple 'one out, all out system' due to the nature of the building, although the ZFP is capable of very powerful cause-and-effect and complex phased evacuation strategies. Every classroom at the college has an exit door and the building has only one floor, so a basic evacuation program was deemed perfectly adequate for this particular project.

For more information, go to www.c-tec.co.uk

Go with the Flow

TYCO FIRE PROTECTION PRODUCTS has launched the i-Flow technology system, its latest innovation in engineered fire suppression for inert gases. It incorporates three innovations working together: the i-Flow valve; the i-Flow check valve; and the matrix cylinder racking design. The i-Flow valve regulates the flow and eliminates the peak pressure spike associated with conventional orifice systems. VdS approved, it limits the output pressure, even in the event of a discharge occurring against a closed distribution valve, making it, says Tyco, one of the safest valves on the market.

The installation of cylinders in the i-Flow system may also feature the i-Flow check valve, which connects multiple components and also ensures the integrity of the system by preventing leakage. The check valve can be placed in any orientation.

i-Flow's matrix cylinder racking design concept offers flexibility when systems have to be installed in tight spaces. The design enables cylinders to be positioned in conventional rows or even arranged around columns fully utilising available space. As well as standard 80-litre cylinders, 140-litre capacity cylinders are available where space constraints demand a smaller footprint. i-Flow installation costs are reduced due to lower venting requirements. The specially designed valve evens out the gas flow creating a reduced flow into the protected enclosure, lowering the over pressurisation effect and venting requirement.

For more information, go to www.tfppemea.com

Pulsating Alert

KLAXON SIGNALS has developed a new range of fire signalling devices that, the company asserts, ensures no one is left behind in a fire emergency. Sonos Pulse fire beacons and sounder beacons emit a high-brightness pulsating light, complying with the new European standard EN54-23 for visual alarm devices. By using light, these beacons reach those who may be audibly impaired, or those working in noisy environments, helping to achieve effective evacuation.

Pulse Alert Technology disperses light evenly, providing maximum coverage using minimal consumption. The devices are designed to alert the need to evacuate with just a single device for most rooms, reducing costs and increasing energy efficiency. They use the same base connections as previous models, and upgrading existing systems to use EN54-23 compliant products is said to be typically a simple process.

For more information, go to www.klaxonsignals.com/fire

Introducing EN12845 FIRE PUMP LINE

Patterson Pump Ireland Ltd. specialises in the production of world class fire protection equipment around Europe.

From enquiry stage, right through design, manufacturing, installation and after sales service, Patterson Pump Ireland strives to provide a quality, reliable fire protection system, at the most competitive price.

EN12845 provides a pan-European standard for the design, installation and maintenance of automatic sprinkler systems, and encompasses the basic requirements set forth by local rules into one European Standard.

The new Patterson Pump End Suction product line is the latest addition to the Patterson Sentinel™ range. Cost effective and efficient, these will be used in fire pump packages specifically designed and built to comply with the regulations of European standard EN12845, along with other local rules.

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A Subsidiary of Patterson Pump Company U.S.A.
Unit 14, Mullingar Business Park • Mullingar, Co. Westmeath, Ireland
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Dubai Detection

Concourse A, Dubai International Airport

FIRE FIGHTING ENTERPRISES' Fireray end-to-end infrared beam smoke detectors have been installed as part of the fire protection system at the recently opened new Concourse A at Dubai International Airport, making a total of 860 Fireray products installed throughout the airport's four terminals that feature exactly the kind of large, high-ceilinged indoor areas that the range is designed to protect.

The Fireray's ability to detect smoke over a 100-metre path between the transmitter and receiver heads, coupled with its minimalist visual impact and easy installation led to it being chosen. The new concourse is the first in the world built to accommodate the giant Airbus A380, with a public space of 528,000 square metres spread across 11 floors and the capacity to handle 15 million passengers a year. The lounges span the entire length of the concourse, making them the largest in the world, and feature high ceilings, sweeping architectural design and modern aesthetics.

This latest order was for 265 infrared beam smoke detectors. The first Fireray products were installed in the airport 15 years ago.

For more information, go to www.ffeuk.com

Conventional AV

KAC has unveiled a new range of conventional audible-visible warning devices designed to deliver outstanding sound and light performance and meets the technical demands of the recently implemented EN54-23 standard for increased effectiveness of visual alarm devices (VADs). The launch follows the recent introduction of KAC intelligent AV devices that complete the new AV portfolio.

For more information, go to www.kac.co.uk

Sprinkler Conference

In May 2014, the European Fire Sprinkler Network (EFSN) and BAFSA, the British Automatic Fire Sprinkler Association will jointly host Fire Sprinkler International 2014 in London.

The international conference and exhibition will showcase best practice and leading edge research and include presentations from leading experts. The core themes of the event are business sustainability, new sprinkler technology and developments in sprinkler standards.

For more information, go to www.bafsa.org.uk

Action Pager

NOTIFIER BY HONEYWELL has launched a flexible range of paging systems, providing building managers with a direct link to their fire system and supporting the deaf and hard-of-hearing in the event of a fire emergency.

The new Response Plus paging system is claimed to contain the latest innovations in wireless paging and monitoring; it comprises a four-watt wall-mounted transmitter and antennae capable of sending customised messages to designated pagers, enabling coverage across a wide area. The system can be integrated with Notifier by Honeywell fire detection systems, immediately warning designated fire marshals exactly where an alarm has been triggered. This in turn ensures that the precise location of an alarm can be identified and validated quickly, improving response times and reducing the cost of false alarms.

The Response Plus system can be customised for any applications, including factories, offices, universities, schools, hospitals, hotels and other public buildings. The system can also be customised for a range of other paging applications, including security, first aid, lone worker and nurse call use. In addition to the Response Plus system, the entry-level Response Link features four dry-contact alarm outputs that provide more basic information about the incident while offering the same paging capability.

To support the deaf and hard-of-hearing in the event of a fire emergency, Response Aid – the third system in the Response range – has been designed to meet recommendations set out by the UK's Equality Act 2010 (formerly the Disability Discrimination Act 2005). The easy-to-use solution sends a strong vibration to each user's pager along with a text message alerting them of the need to evacuate the building.

For more information, go to www.notifierfiresystems.co.uk

STI (Europe) "We protect the things that protect you"

Safety Technology International; is a family owned and operated business that began over 30 years ago with Jack Taylor's invention of the Stopper Pull Station Protector. With offices in Michigan USA, Worcestershire in England and Alicante in Spain, STI markets an extensive range of products throughout the world to prevent false fire alarms, theft and vandalism to essential fire and security equipment.

Within the range is the renowned Stopper, an audible polycarbonate protective cover designed to retrofit over fire alarm break glass call points. The Stopper is now globally recognised by authorities as an essential fire system component on sites were the risk of false fire alarms is high, for example schools, colleges and universities.

The polycarbonate range has now been expanded to include an IP56-rated version called the Enviro Stopper. An ideal solution to extend the life and reliability of call points and switches exposed to harsh conditions such as factory wash down areas.

Also within the Stopper line are alarm devices for fire extinguishers and fire doors as well as a comprehensive range of protective anti-vandal cages for CCTV, emergency lighting, smoke detectors, fluorescent lights, bells and sounders.

The latest product launch from STI is the new Wireless Alert series, specially designed to protect and monitor all areas of your business from one convenient location.

Using innovative wireless technology the integrated system monitors STI wireless alert devices. The STI device(s) emits a localised alarm and also transmits a triggering alert signal to the 8-Channel Receiver. The receiver provides a visual and optional audible indication every time there is unauthorised/authorised opening of a fire door or the removal of a fire extinguisher. By combining the unique features of the Exit and Extinguisher Stopper, fire doors and fire extinguishers will be monitored 24/7, improving the fire safety of buildings and their occupants.

The remote 8-Channel Receiver can be placed up to 300 metres (line of sight) from the monitored fire door(s) or extinguisher(s). The compact design makes it easy to either wall-mount or place on a desk. The 8-Channel Receiver is capable of remote wireless monitoring up to eight individual devices and provides supervision for low battery and signal reception of STI wireless alert devices. The inbuilt relay can also allow you to trigger additional external systems or warning devices during activation if required.

STI (Europe) will be promoting the Wireless Alert Series at International Firex at the NEC in Birmingham from 13th-16th May, 2013. For a demonstration visit us in Hall 3A, on stand 3/M21. For further information on how the Wireless Alert Series can protect your business please contact sales on free phone 0800 085 1678. IFP

For more information, go to www.sti-europe.com


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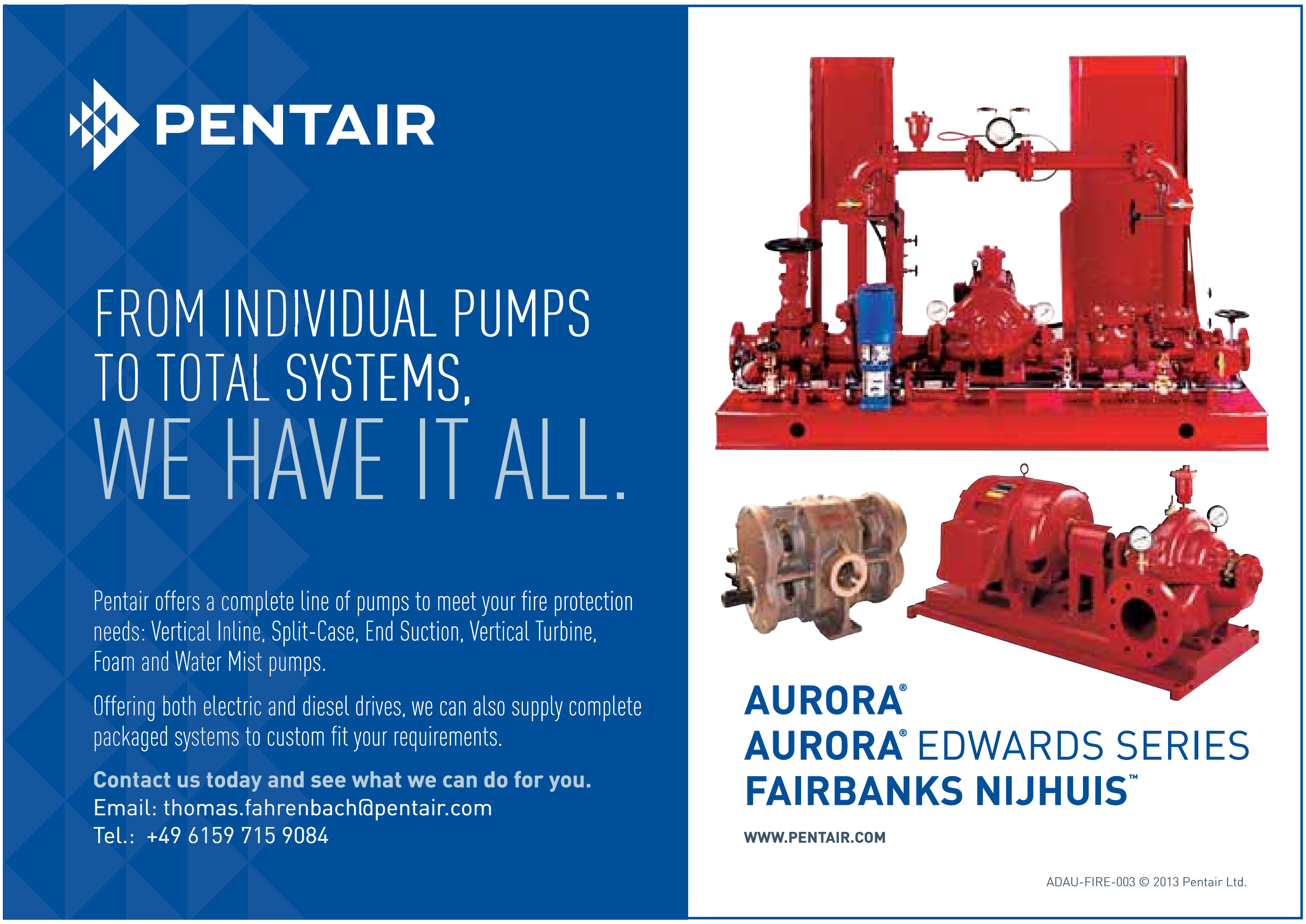
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PROFILE

En54-5 CPD Certification for Oggioni TMP Detector

OGGIONI S.a.s, leader in the production of fire and gas detection systems, has achieved European Standard EN54-5 certification for its TMP heat detectors.

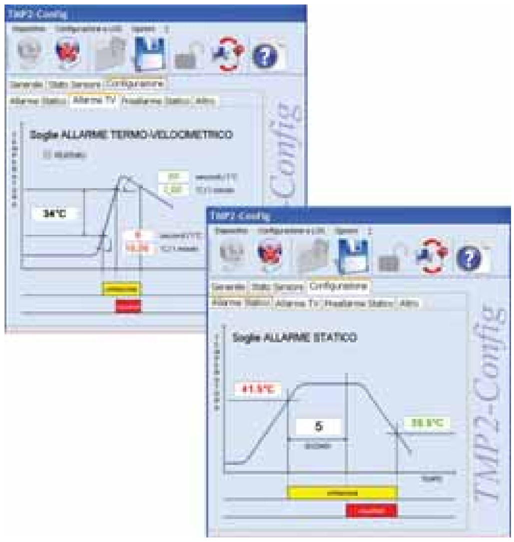
TMP heat detectors are sturdy, shock and vibration resistant, capable of sustaining impacts of up to 4g-force of 100 ms and vibration from 0.5 to 200 Hz with acceleration of 4g. They are particularly suitable for dangerous environmental conditions such as in presence of corrosive elements or condensing steams.

TMP heat detectors, with their high reliability, dependable long-life, immunity from EMI disturbances, adjustable rate-of-rise, self-diagnosis capability, wide range of temperature settings (from –20°C to 120°C) and very low power consumption (about 20 µA) are compatible with any conventional fire alarm control panel on the market.

The incorporation of configurable red LED signalling makes it possible to easily understand detector conditions. Standard configuration is "LED off", in normal condition (in order to avoid power consumption) and "LED on" in alarm condition (in order to immediately identify the detector "in alarm" when in a loop of detectors). Different LED configuration is available to match specific customer's requirement or application or environment needs.

ATEX versions of TMP heat detectors are also available for use in explosive atmospheres. (Certificate ATEX II 2G Ex d IIC T6).

They are now available with TMP2-Config, the new diagnostic and configuration software that allows connection and interaction with a standard PC (by serial communication protocol). With this new, and user friendly communication software, it is now possible for installers and/or distributors to program and/or change configured temperature setting, enable or disable the rate-of-rise intervention, check alarm events, and see general information and the sensor status.



This new features provides trained personnel the opportunity to set-up the TMP exactly as the customer or the environment demands, provide support to all end users and carry out periodical checks and provide after sale support.

Applications for the TMP heat detectors include:

- Over temperature and suppression release devices.
- Commercial and industrial plants.
- Explosive atmospheres.
- Hazard material stores and enclosed machinery spaces.
- Extraction ducts.

Established in 1996, Oggioni S.a.s. has rapidly become a major player in fire and gas detection. Continuous development enabled us to become one of the principal supplier of ATEX certified toxic/explosive gas detectors, electronic heat detectors and data acquisition modules, dealing with important national and international companies.

The philosophy of Oggioni is to offer continuous technical support and qualified after sale service, systems made on customers' specifications, equipment with high technical specifications following European standards and competitive prices. IFP

For more information, go to www.oggionisas.com

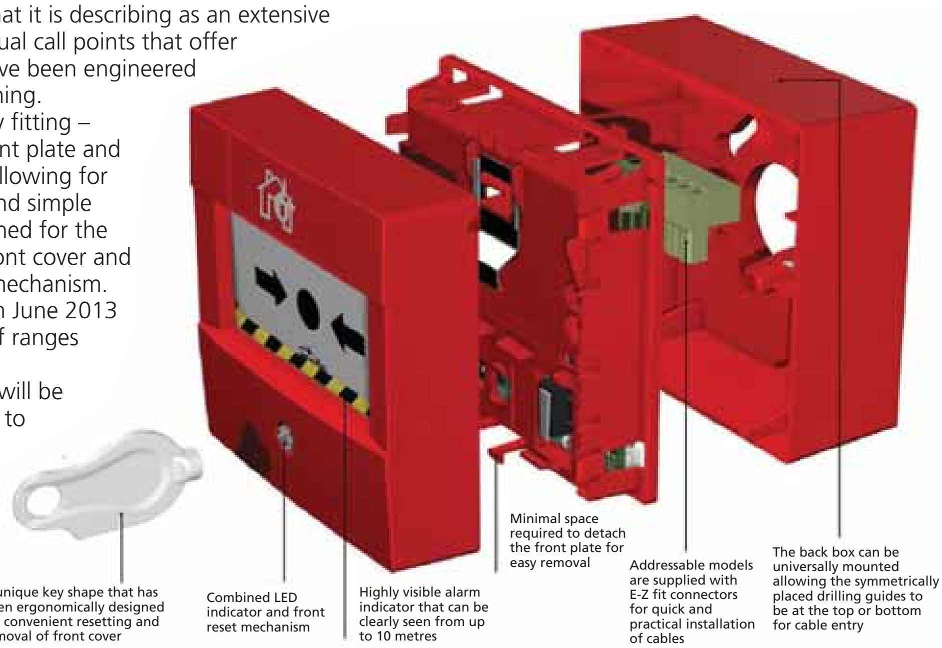
New Manual Options

APOLLO FIRE DETECTORS has launched what it is describing as an extensive collection of EN54-11 2001 approved manual call points that offer Apollo's lifetime product guarantee and have been engineered to provide easy installation and commissioning.

The new call points are said to offer easy fitting – minimal space is required to detach the front plate and the back box can be universally mounted allowing for cable entry at either the top or bottom – and simple maintenance with an ergonomic key designed for the convenient resetting and removal of the front cover and a combined LED indicator and front reset mechanism.

The manual call points are available from June 2013 in Apollo's XP95, Discovery and Waterproof ranges (IP67 rated).

Over the course of the next year Apollo will be extending the engineered call points range to include conventional, intrinsically safe, marine, SIL and non-standard coloured variants. The company's existing call points will continue to be available during this time.



For more information, go to www.apollo-fire.co.uk/mcp

Detection Range Upgrade

ZITON has introduced what it describes as: "significant improvements" to its ZP7 range of fire detectors and notification devices, offering: "…enhanced appearance, performance and installation efficiency".

Across the whole ZP700 range the devices are now available in polar white. The new ZP755BV base sounder beacon now facilitates device address sharing to its full extent and allows for the installation of the notification device to share the address with its detector. At the same time, it still gives full flexibility in programming, with the result that Ziton now breaks the 127-devices-per-loop barrier.

For more information, go to www.utcfssecurityproducts.co.uk

Approved Beacon

E2S has gained EN54 Part 23 certification from VdS for its L101 beacon, gaining full compliance to the new standard that became effective from 1st March 2013 in most of Europe, and which will be in place from 1st July in the UK. Certification has been achieved for wall mount, ceiling mount and open class with either red or clear lenses, allowing it to be used in all locations with fire system installations.

In addition to the stand-alone beacon, certification has been achieved for all E2S combination sounder/L101 beacon units creating, claims e2v, the most comprehensive range of products approved to the new standard available from any manufacturer. The EN54-23 approved units operate from 24VDC for use in fire systems. Synchronised versions are available for multi-beacon systems; the units measure 86mm by 86mm and accept 0.5 to 4.0mm^2 cables to reduce installation time.

For more information, go to www.e2s.com

New Fire Alarm Products

FIKE SAFETY TECHNOLOGY has launched a range of new products for its Twinflexpro smart two-wire fire alarm system, including a new repeater panel, an intelligent combined smoke and heat detector, and a sounder and strobe in a single enclosure.

For more information, go to www.fikesafetytech.co.uk

Cooper Fulleon's New LX Range

New LX range to be demonstrated at Firex International, NEC, Hall 3, Stand K10

Cooper Fulleon's new low current LX beacon range has been designed to comply with the stringent EN 54-23 standard for visual alarm devices (VADs). While providing the lowest current consumption with the highest possible light output, the LX technology centres on the management of light and has been built into beacon and sounder beacon formats with options for both walls and ceilings.

Increasingly used throughout buildings, beacons need to be considered for warning the deaf or hard of hearing and in areas of high ambient noise.

Three years in the making, the LX range is the result of extensive research into the requirements of the European fire market and features two patented technologies including an innovative lens and flash pattern. Both are designed to reduce current consumption, creating a product that delivers an EN 54-23 compliant flash, (in both the wall and ceiling categories) of up to 7.5 metres for as little as 10mA. No other product can deliver this coverage volume at that level of current consumption.

Unique LED and Lens Technology

The biggest challenge with EN 54-23 is to achieve the 0.4 lux over a wide area with the lowest possible current consumption. To meet the demands of delivering a current consumption as low as 10mA, Cooper Fulleon's new generation LX range is built on the latest LED technology, enabling it to deliver a stable and reliable light output for an extremely low power input.

The range's innovative and patented lens technology means that it distributes light with extraordinary efficiency. Light is refracted to remove hot spots directly in front of the LED and then re-distributed to illuminate dark spots where traditional solutions would fail to meet the 0.4 lux minimum requirement. It is important to control the available light accurately, as any light outside of the volume prescribed in EN 54-23 will waste power and increase the cost of the system.

Flash Options

Throughout many parts of Europe, a red flash is synonymous with fire. The challenge of achieving the 0.4 lux required by the standard with a red flash is that it requires a huge increase in power consumption if traditional approaches are used. The LX range however, is available as a white flash or red flash product; with the latter delivering the same coverage as a white flash for the same current consumption.

In some countries red or white flash colours are not appropriate as they do not follow traditional custom and practice. The answer is ChromaPlus which comprises of an EN 54-23 approved white flash with a built in coloured indicator. Available in a variety of colours, ChromaPlus overcomes market barriers associated with a red or white flash and delivers an EN 54-23 approved solution.

Flexibility

Central to the range's design is the flexibility to alter the flash rate, coverage and flash colour at the click of a switch. These settings allow the products to meet the unique requirements of each specific area and to manage power consumption in the most efficient manner. This offers ultimate flexibility, providing simplified stock management and reduced stock holding.

Firex International 2013

Visit Hall 3, Stand K10 to see the new LX range in action and find more information on the innovative technology used in the LX products or about EN 54-23. A range of resources will be available on the stand including an informative pocket guide based on the Loss Prevention Code of Practice CoP 0001, a demonstration of Fulleon's new online specifying tool and a chance to register for one of our leading CPD seminars on EN 54-23.

Alternatively, visit the Firex Academy in Hall 3, where Cooper Fulleon will be leading a seminar on Visual Alarm Devices and the implications EN 54-23 has on their use and installation. The seminar will be held on Wednesday 15th May at 15.45pm to 16.30pm. IFP

For more information, go to www.cooperfulleon.com

Indoor Optical Flame Detection for Large Open Areas

There are ever-growing demands for high performance, reliability, availability and high immunity to false alarm events for fire detection systems employed in large open areas such as atria, airports, stadiums, storage areas and other such large office and public buildings.

These demands spurred SPECTREX to develop the SharpEye 20/20MPI, a cost effective, lightweight IR3 optical flame detector, specially designed for such indoor applications, providing the high performance and false alarm immunity until now used only in the high risk, offshore oil and gas industries.

Fire extinguishant activation needs to be based upon a reliable alarm signal, with minimal chance of false alarm. Smoke detectors are required by the authorities and are commonly used in commercial and industrial buildings. They function by detecting the smoke that, first, has to reach them. This can take some time, particularly in large spaces. However, some fuel and gas fires spread quickly and produce little or no smoke. Therefore, a sensible supplement to smoke detection in large open areas is the ability to "see" a fire from a long distance.

This need is cost effectively addressed by the model 20/20MPI optical flame detector, which is a low cost, high performance, compact Triple IR (IR3) flame detector in a lightweight, polycarbonate housing, particularly suited to indoor applications and provides the benefits of IR3 optical flame detection – namely long distance detection, up to 43 metres from the fire, rapid response of less than five seconds, and high immunity to false alarms, particularly where there is a large area of windows and prevalent sunshine.

Detection in Large Atria

Due to the large open space where fire detection is required, optical flame detectors are particularly suited to this challenge. Where standard smoke detectors require the smoke to first reach the detector, optical flame detectors do not – they can immediately "see" the flame from a long distance.

This dramatically cuts the time taken for the detector to alarm and, in turn, much less damage is caused. In addition, smoke detectors can falsely detect smoke that is unrelated to fire, steam and other fumes, while optical flame detectors detect only the fire itself. While large windows may have caused sunlight interference with optical flame detectors, installing the 20/20MPI Triple IR Optical Flame Detector would massively minimise the possibility of false alarms.

Background

Spectrex's well proven, industrial Triple IR (IR3) optical flame detector is a high performance Ex

proof device and has, so far , primarily served the oil and gas and other high risk industries with over 60,000 detectors installed in the last ten years. Now, with the introduction of the SharpEye 20/20MPI, this same high performance and reliability is available to commercial and industrial sites.

Optical flame detectors are based on detecting the unique characteristics of the electromagnetic energy emitted by a fire, including its "spectral signature" and frequency pattern and distinguishing it from the other myriad of heat radiation sources and black-body radiation in the surrounding atmosphere. Flames emit electromagnetic radiation at a wide range of wavelengths, which vary depending on the material/fuel being burned and environmental conditions, which affect the radiation transmission in the atmosphere. Optical flame detectors operate by sensing one or more of these wavelengths.

The major breakthrough in modern flame detection was the introduction of Triple Infrared (IR3) technology. This patented technology revolutionised the field of fire safety by providing long-range, highly sensitive, fast response flame detectors with exceptional false alarm immunity. Industrial Ex proof IR3 detectors can detect a standard 0.1 square metre gasoline fire at a distance of up to 65 metres under extreme weather and harsh industrial conditions, with an incomparable low false alarm rate. They do so with three IR sensors; one of them sensitive to infrared radiation emitted by the hot CO_2 product of a fire and the other two are reference sensors, sensitive to background radiation (at longer and shorter wavelengths). These signals are further analysed mathematically, to better distinguish between a real flame and the background (non-fire radiation sources) that may exist in the monitored area. IFP

For more information, go to www.spectrex.net

Protectowire FiberSystem 8000

Fibre Optic Linear Heat Detection for Special Hazard Applications

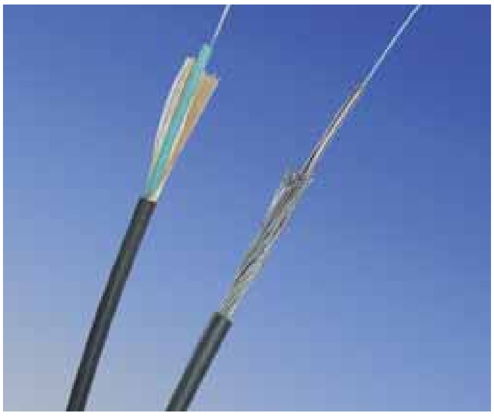
In today's complex industrial environments, the potential for downtime and financial losses caused by overheating and fire can be disastrous if not detected and located quickly. That is why Protectowire linear heat and fire detection systems are the first choice of many design professionals.

Our new FiberSystem 8000 is based upon today's most advanced technology in the field of fibre optic temperature measuring techniques and incorporates many unique and specifiable features not available on competitive systems.

The Protectowire FiberSystem 8000 measures temperatures by means of optical fibres functioning as linear sensors. Temperatures are recorded along the sensor cable as a continuous profile. This ensures high accuracy of temperature discrimination over great distances or large surfaces, while reducing measuring times. The sensor cable contains no electronics and is therefore immune to electromagnetic disturbances of all kinds.

Like all Protectowire linear heat detection systems, the FiberSystem 8000 will provide an exact location of the fire or hot spot anywhere along the sensor's length and features:

- **Unique Zoning Capabilities**
  A single length of sensor can be partitioned into different segments (zones) for various requirements (for example, video, ventilation, and extinguishment). Zones can be defined as desired and even overlapped, increasing system control capabilities.
- **Multiple Alarm Initiating Criteria by Zone**
  Alarm initiation may be based upon a maximum temperature per zone, temperature development per zone in terms of time, or temperature difference between a measurement location and the zone's average temperature.
- **Capable of Providing Visualization of the Fire Size, Based on the Length Of Sensor in Alarm**
- **Capable of Determining the Direction of Fire Spread**
  Most fires have a dominant direction of spread. Knowing this direction of spread, the intervention forces can direct their attack to the less dangerous side of the fire.
- **Available Dual Channel Operation**
  All FiberSystem 8000 PTS 8200 Series Controllers contain two channels and are configured to operate in Dual Channel Single End mode, or Dual Channel Closed Loop Mode. In a Dual Channel Single End configuration, the Controller performs single ended measurements on two separate fibres thus providing two distinct detection "channels" or areas of coverage. In the Dual Channel Closed Loop operating mode, the sensor cable is installed in a loop, and the Controller performs measurements from both ends of the fibre. Should a break in the fibre occur, the entire sensor cable length continues to be monitored from both directions up to the point of the break, thus providing complete detection coverage.



Enhanced User Interface Capabilities

The Controller is provided with four optically decoupled inputs and twenty voltage free outputs for status reporting to a main fire alarm panel. The system can be integrated easily into your management platform (for example, SCADA systems) by either directly communicating over Ethernet (TCP/IP) using SCPI (Standard Commands for Programmable Interface), or Modbus RS232, RS422, RS485 and TCP/IP.

The configuration software is the heart of the new Protectowire FiberSystem 8000. It provides an easy to use graphical computer interface to the PTS Controller and can be used as the basic application for calibrating the sensor, creating configurations, creating measurement sequences, starting measurements, and viewing traces. The software makes it possible to create multiple zones along a single length of sensor cable, determine the direction of fire spread, provide visualisation of the fire size based upon the length of sensor in alarm and configure zone related alarm generated outputs for event handling.

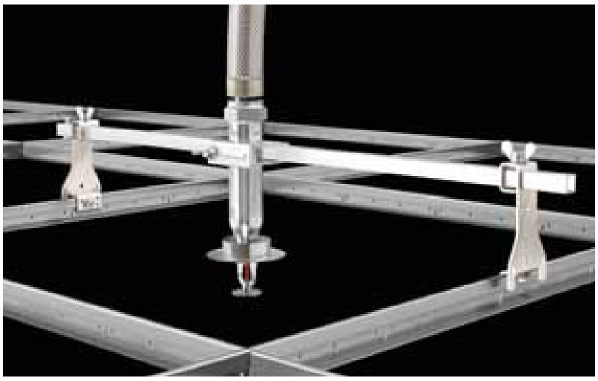
Protectowire is dedicated to providing products designed, engineered, and manufactured with the highest degree of quality and reliability. This is demonstrated by 75 years of excellence within the fire protection community. We are an ISO 9001 Registered company and hold other specific approvals and patents around the world. IFP

For more information, go to www.protectowire.com

New Sprinkler Bracket

Mechanical pipe joining and fire protection systems company, VICTAULIC, has introduced a new Style AB1 bracket and renamed the AquaFlex sprinkler system product line to the VicFlex sprinkler fitting system.

VicFlex is said to offer fast and dependable installation, durable performance and is cost effective for maintenance and retrofit applications, requiring fewer man hours to install while lowering shipping costs with its more



compact form. It is being promoted as being a convenient and safe solution that is easier to position than rigid pipes.

The new Style AB1 bracket eliminates the need for sprinkler installers to handle ceiling tiles, cut holes in ceiling tiles and coordinate with the ceiling trade on site, reducing hands-on installation time by as much as 39 percent.

For more information, go to www.victaulic.com/vicflex

Glow in the Dark is not an Option

With the sales of non-electrically charged photo-luminescent exit signs on the rise, ICEL – the emergency lighting arm of the UK's Lighting Industry Association (LIA) – and the Federation for National Manufacturers Associations for luminaires and electro-technical components for luminaires in the EU (CELMA) have, in response to questions from the market, evaluated whether such signs can be compliant with the various requirements for emergency lighting.

Their conclusion is that photo-luminescent ('glow in the dark') exit signs as an alternative to internally or externally electrically illuminated escape route signs would not meet the requirements of the UK's Fire Safety Order guidance and other regulations and, therefore, should not be used instead of internally or externally electrically illuminated escape route signs.

For more information, go to www.icel.co.uk

The HD Range of Deluge Skids

HD Fire Protect is a leading manufacturer of world-class water and foam based firefighting equipment. HD product range comprises of an extensive range of deluge valve models with various construction materials, trim types and features.

Deluge valves, which are also known as system control valves in a deluge system, are used for the fast application of water in spray systems. Deluge systems protect areas such as power transformer installation, storage tanks, conveyor protection and various other industrial applications. With the addition of a foaming agent, deluge valves can also be used to protect areas such as aircraft hangars and inflammable liquid stores.

In order to make deluge valve systems more user-friendly, it is necessary to consider operational ease as well as faster and convenient installation. With this in mind, HD Fire Protect has designed and manufactured a range of deluge skids. These deluge skids are standard modular packages. The skids are either standard UL Listed models or custom engineered to meet specific requirements. Primarily the skids can be categorised as skid cabinets or open-type frame mounted.

In the case of skid cabinets, the whole skid assembly is contained inside a stainless steel, powder coated cabinet. The cabinets have been designed to have an aesthetically pleasing appearance. All of the gauges are visible externally through a transparent polycarbonate window, while all of the side panels are easily removable for ease of maintenance. The cabinets can also house a temperature control feature for when skids are likely to be used in extreme or freezing temperatures. Open skids are mounted on a steel frame.

The deluge valve mounting could be vertical or horizontal. The open skids can also be supplied as multi-line deluge valve skids, where between three and six deluge valves can be mounted vertically on a single skid. There are also a number of special skid designs, for example, where factors such as space constrains need to be taken into account, when compact vertical skids are available. Flanged or grooved connections are provided, and recently HD Fire Protect also launched a skid that is suitable for sea water applications. In that case the complete skid is built using corrosion resistant materials.

The HD skids are completely pre-assembled and factory tested, and generally come with downstream, upstream and bypass valves, which can be gear operated using butterfly valves or gate valves. Instrumentation, such as pressure switches, solenoid valves, pressure transmitters, limit switches and basic control panels are mounted, pre-wired and terminated into a junction box. IFP

For more information, go to www.hdfire.com

FIREX Internation

FIREX International, one of the world's largest dedicated fire safety events, is returning to the Birmingham NEC in the UK from 13th to 16th May with its strongest ever proposition, as it becomes an annual event. With more than 150 exhibitors showcasing the latest innovative, cost-effective products and services, over 14,000 key decision makers and qualified fire protection professionals will visit from over 70 countries across the globe.

With a focus on the latest thought-leadership to discuss and determine the past, present and future of fire safety, the FIREX International educational offering will be driven by live, industry-driven, issues. Key to the exclusive programme of insight is the first look at the Lakanal house incident, with input from the Fire Sector Federation. This briefing will discuss the recently published inquest into the Lakanal house fire in London in 2009, highlighting the key areas of non-compliance, oversight and operational confusion. This session will assess the outcomes of the inquest and the implications the recommendation will have on future fire safety measures, in a highly anticipate panel discussion.

The FIREX Academy will be the epicentre of education at FIREX International 2013. Sponsored by Hochiki Europe and in association with the Fire Industry Association (FIA), the Academy will offer insightful knowledge from key industry figures and hold topical debates based on the entire safety system in a building. Focusing on how the end user should approach the interaction between active and passive fire protection systems, it will be stressed that each area holds equal importance. Seminar topics have been confirmed, with contributions from a wide range of respected industry players.

With a firm emphasis on promoting expertise and guidance, the FIA is a major contributor with highlight seminars including 'Fire & Rescue Service Limited: Charging and Trading'. In this session, Graham Ellicott, CEO of the FIA, will discuss how the UK fire service is looking to provide commercial services and the impact this will have on the fire sector in general. Martin Duggan, FIA's General Manager will also provide an update on the launch of the Competency Council Document and discuss the upcoming national guidelines for acceptable criteria for fire risk assessors with the aim of raising levels of competency.

Simon Ince, Manager of Personnel Certification Schemes at Warrington Certification will lead the seminar 'Happy with Your Fire Risk Assessor? Choose wisely...'. Providing insight into the heavy fines enforced by courts to organisations that fail to implement the correct fire safety precautions in buildings, Simon will provide advice on the important elements that need to be taken into consideration when selecting a competent fire safety professional.

Wilf Butcher, CEO of the Association of Specialist Fire Protection (ASFP) will turn attention to the inherent dangers of aesthetic cladding and curtain walling systems when used in modern methods of construction. The seminar 'Great Looking but

al 2013

Deadly!' will take a detailed look at recent events such as the high rise Tamweel Tower in Dubai, which suffered a large scale fire in November 2012. Hosting a topical discussion on the conflicts between fire safety requirements and sustainability during 'When It's Risky To Be Green', Wilf will also take an objective look at when fire safety will need to take precedent over sustainability where essential building materials and practices are concerned.

A major panel discussion and presentation on holistic approaches to fire safety will see contributions from major stakeholders such as the FIA, FPA, ASFP, LPCB and Warrington Certification. 'Fire United: A Holistic Approach To Fire Safety' will provide an understanding of how well installed, third-party approved active and passive fire safety systems work in harmony – providing the maximum level of protection.

During the 'Fire Risk Assessors: An Endangered Species' seminar, fire safety solicitor, Warren Spencer, from Blackhurst Budd Solicitors will present a highly valuable legal take on the current position of fire risk assessors. Simon Adams, Business Manager at Gent by Honeywell, also joins the programme, presenting findings on the ever critical issue of false alarms and their impact using in depth analysis from recent case studies.

Warrington Certification will be hosting another seminar around the Construction Products Regulation (CPR). 'The Clock's Ticking for CPR..' will detail the effects felt by manufacturers, distributors, end users, specifiers and architects when the CPR is enforced on July 1st 2013. Paul Duggan, Certification Manager at Exova Warrington Fire, will provide guidance on the steps to take as this becomes one of the priorities to make all products traceable back to the person placing them legally on the market.

2013 FIREX International Features

- **New for 2013: The Intelligent Buildings Seminar Theatre**
  Situated in the dedicated Intelligent Buildings area (a combined fire and security solutions area for both FIREX and IFSEC International) the Intelligent Buildings Seminar Theatre, centred on holistic solutions and the common area of systems integration and convergence, will create opportunities for inter-operability and information sharing between fire, security, IT, data and building management systems.
- **New for 2013: Fike TechZone**
  Fike has created a unique experience for its customers at FIREX International this year. The Fike Tech Zone is presenting new, innovative, products from its fire suppression and fire alarm businesses. From the latest video technology combined with actual working equipment, visitors to the TechZone will experience a near 'real life' demonstration of Fike products in action in the protection of life and critical assets. The Fike TechZone will also be surrounded by a number of Fike distributors presenting their individual expertise and services.
- **FPA Infozone**
  The FPA infozone is an educationally-led feature with its own seminar area. The FPA infozone will focus on a number of end user and installer targeted subjects such as risk assessments, false alarm reduction, sustainability versus fire safety, legislation and compliance.
- **ASFP Pavilion**
  Comprising a networking stand for the ASFP (Association of Specialist Fire Protection) and surrounded by exhibiting members, this association-led feature will focus on passive fire protection where the central focus will be a 'meet the expert' resource.
- **LPCB Red Book Pavilion**
  The Red Book Pavilion is a platform for the LPCB (Loss Prevention Certification Board) to highlight and promote the importance of third-party approvals for fire safety systems and products. The LPCB will host a number of presentations on its stand with an additional 'meet the industry experts' focus in the form of an advice clinic. IFP

FIREX International
FIRE PREVENTION, DETECTION & PROTECTION
13-16 May 2013, NEC Birmingham, UK

For more information, go to www.firex.co.uk

NFPA Conference & Expo 2013

Every year, thousands of fire, electrical and building safety professionals from around the world consider the NFPA Conference & Expo to be a "must attend" event. What do they know that keeps them coming back?

They know there is no better place to spend time when they are looking for ways to do a better job, update their knowledge, solve a problem, save money and, in general, show their commitment to a very important shared mission. A mission that has been the NFPA's for more than a hundred years – reduce the pain, suffering, and financial burden created by a fire, an explosion, or an unsafe electrical discharge.

What is the NFPA?

NFPA is the world's leading advocate of fire prevention and an authoritative source on public safety. NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimise the possibility and effects of fire and related risks – codes and standards that influence every building, process, service, design, and installation in the USA and many other countries.

These codes have been developed by its members and other industry stakeholders over the course of the association's 115 years of concerted effort, and are continuously refined through research, training, communication, and a robust consensus building process.

The annual event, the NFPA Conference & Expo, plays a key role in developing and disseminating code information through a comprehensive technical program, and for the ever evolving consensus codes, the Association Technical Meeting where revisions, motions, and consent documents are presented and voted on. This year it is being held in Chicago from the 10th to 13th June.

Who Should Attend NFPA Conference & Expo?

Professionals concerned with protecting people and property in any and all building and facility types; and anyone who shoulders responsibility in the areas of:

- Fire Prevention.
- Life Safety.
- Electrical Safety.
- Premise Security.
- Building Design & Management.
- Fire & Emergency Services.
- Loss Control & Risk Management.

Conference Program

The 2013 conference offers more than 150 educational sessions, divided into twelve tracks to help attendees identify sessions that best meet their needs and interests.

- **Research (34 Sessions)**
The latest research into critical fire and life safety initiatives, including the reliability of emerging technologies.

Record-setting Exhibition

Alongside the conference programming is a three-day product exposition featuring the world's top suppliers.

Over three hundred exhibitors will be demonstrating the latest products, technologies and equipment for fire prevention and suppression; alarming and mass notification; system design and installation, testing, maintenance; and enhancing life safety measures.

- **Building & Life Safety (17 Sessions)**
Technologies, best practices, and statistical data needed by designers, engineers and building and fire officials responsible for plans review, inspections, and other building-related tasks.
- **Codes & Standards (51 Sessions)**
Expert guidance on the practical application of NFPA codes and standards, as well as information on recent updates and changes.
- **Detection & Notification (10 Sessions)**
Code requirements and design issues affecting the application of new technologies in alarm and signalling systems, and the impact of maintenance on systems performance.
- **Electrical (13 Sessions)**
Best practices in the electrical industry and how they are influenced by new electrical design issues, successful maintenance programs, effective inspection techniques, and safety programs.
- **Emergency Preparedness/Business Continuity (10 Sessions)**
The latest methodologies for accurately assessing risks and consequences, emergency preparedness, contingency planning, incident management and recovery capabilities.
- **Fire & Emergency Services (46 Sessions)**
A look at what is new in firefighting technology, safety preparedness for first responders, incident command strategies, and fire prevention and inspection techniques.
- **Fire Protection Engineering (14 Sessions)**
Ideas for meeting fire protection challenges using computer modelling, field testing, post-incident analyses, and other methods for developing performance-based building solutions.
- **Fire Suppression (25 Sessions)**
The importance of proper design, installation, inspection, testing, maintenance, and plans review on sprinkler system effectiveness.
- **Green (3 Sessions)**
How environmentally-friendly initiatives affect the design, maintenance, and testing of fire and life safety systems and components.
- **Loss Control/Prevention (13 Sessions)**
Strategies for mitigating risk through accurate assessment of occupancy and commodity classification, enhanced reliability of fire protection systems, and other risk factors.
- **Public Education (19 Sessions)**
New planning strategies and creative solutions for meeting the challenges of effective public fire and life safety education.

For more information, go to www.nfpa.org/conference

Your Kind of Town

The NFPA Conference & Expo travels in a multi-city rotation, this year it will be held in one of the world's top destination cities, Chicago.

Two New Event Features for 2013

- **Electrical Vehicle Safety Training**
This showcase area will address the potential hazards encountered in an electric vehicle (EV) collision, as well as safety considerations for the growing installed base of charging stations in residential, commercial, and public spaces.

Stakeholders affected by growth in EV usage and build-out of the battery-charging infrastructure include utilities, fleet managers, municipal authorities, first responders, and electrical contractors.

Visitors will find information on the NFPA's first responder training programs and on industry training & certification programs on proper installation, inspection, and maintenance of charging stations.
- **Accessibility Expo**
The Inaugural Accessibility Expo will co-locate with NFPA Conference & Expo and will feature products specifically designed to help comply with accessibility standards and to improve quality of life and safety for people with disabilities.

This new event feature, along with six related sessions in the NFPA conference program, is designed to inform building designers, builders, managers and safety executives, and to promote a commitment to move beyond the minimum requirements of the Americans with Disabilities Act.

Register and Book Your Hotel

You can register in advance at www.nfpa.org/conference. The exhibition is free when you pre-register.

Get the NFPA Conference & Expo App

To get the most out of your time at the show, add the NFPA Conference & Expo mobile app to your phone or tablet (available 30 days before the event) and create your own customised schedule. Search and add conference sessions you would like to attend, flag exhibits you plan to visit, and then access your custom, time-saving schedule during the show!

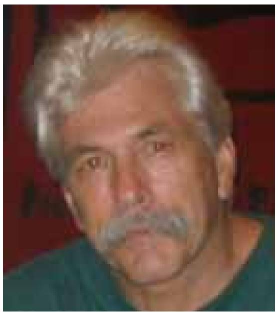
For the free download, search NFPA C&E on the app store of your choice.

See What's Happening Now

Visit the event blog for the latest updates, coming attractions, and local colour… http://nfpa.typepad.com/conference/ IFP


One size does
NOT fit all...

ASD in Industrial a Environments: Par



Paul Leslie

Xtralis

The correct application of fire detection in industrial applications is no less important than that of any commercial or residential application. The fundamental issue that seems to challenge many however, is that of the selection of equipment. What is the most appropriate fire detection equipment for the job? Communication is the key.

The development of fire detection products has come a long way over the past 25 years. In earlier times the choice of equipment was limited and somewhat basic in performance. Today the industry has a myriad of equipment available from which to choose. Equipment manufacturers inevitably come up with new ideas, introduce innovative techniques and develop specific equipment with the aim of satisfying new needs and capture greater percentages of the available market. The industrial market sector in particular however has always been one area where traditional detection equipment struggles with performance for a variety of reasons.

Technology or new equipment development brings with it certain questions, one in particular is: "what is the best technology or type of equipment available to serve the particular risk?" This is not an easy question to answer, since each application and environment is so individual, and each has its own idiosyncrasies and needs that lend it to specific types of equipment. As a result we are challenged with how to make the right choice. Determining the most suitable equipment puts pressure on those that are involved directly with the installation of fire detection systems, those that specify systems, cover risks, attend to system alarm call-outs and certainly the end user who lives with the life cycle cost of any system installed.

Cost too plays a very important role in system equipment selection. One could even be forgiven if, on occasion, we become lost in the "smoke cloud" surrounding equipment preference. Nevertheless, having an ever increasing number and choice of detectors available to us and with the wide variety of applications in which they can be installed, there is no doubt that in many applications equipment is being misapplied.

There are several reasons for this; often a limited knowledge of the equipment and technology available, a lack of understanding of the application and environment, a lack of understanding of design around sustainable maintenance for the life of the equipment and certainly budgetary constraints. The need to simply win projects by installing the least expensive equipment is also a known industry concern.

The best outcomes are realised when the key stakeholders communicate openly and collaboratively to identify the variables that a detection

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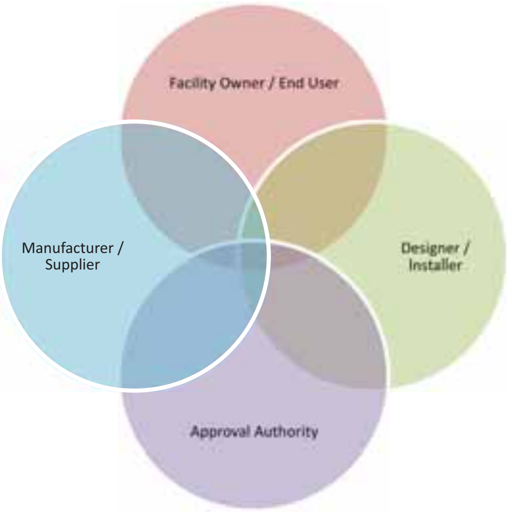


Figure 1. Key stakeholder collaboration

system will be required to perform against. Figure 1 includes these key stakeholders, being the end user, the product developer, system designer and approval agency (where required).

Without this communication, the objectives of the system can be unclear to the different parties and the incorrect selection, installation and approval of an appropriate detection system to mitigate the known risk can have very negative and costly consequences.

This article focuses on key issues that should be considered in the selection of appropriate detection systems and provides some useful processes for evaluating the available detection options in the industrial market sector. Any of the suggestions provided here though are only as successful as the communication between key stakeholders to consider them.

The Industrial Market Sector

The term "industrial" generally refers to that market sector involved primarily with manufacturing, processing and other similar operations.

Industrial applications present many challenges for effective and reliable fire detection. Not only does the fire detection system need to detect fires at the earliest possible stage it must also be able to withstand the various environmental conditions without generating nuisance alarms.

Conditions can vary from mildly contaminated to that of high background pollution. While many of the cleaner areas, for example, control rooms, switch rooms, and the like can be easily catered for by the use of 'standard' forms of smoke detection, there are areas that require careful thought with regard to the selection of equipment. In high background pollution environments or where constant dust exists, or even where smoke and fumes need to be tolerated as part of "normal" operation, the challenges in applying effective fire

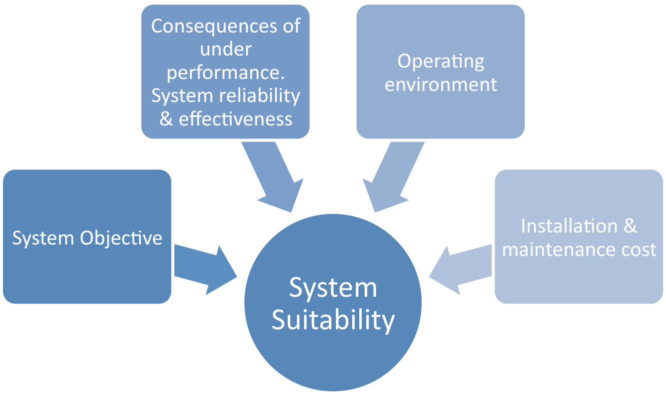


Figure 2. System suitability

detection in these situations becomes even more difficult.

Equipment must perform when dust, dirt, and high levels of background pollution exist, contend with varying airflow conditions and finally offer the best possible benefits for the total cost of ownership over the life of the detector.

Site Characteristic & Fire System Objectives

Industrial site characteristics are generally wide and varied. Large fuel loads, high temperatures, toxic, flammable and /or corrosive gases and liquids, wash downs, variable air movement, high ceilings … the list goes on; significantly different to the commercial office or shopping centre. Many sites can be slow to evacuate creating a real need for the earliest fire detection notification possible.

The fire protection objectives may vary but are also no less important than those in the commercial world, generally set down by insurers, owners and site managers applicable to the individual site and risks. These for example may include:

- Minimise the potential for fires and explosions through an effective fire prevention plan.
- Provide an effective means of limiting the size and consequence of fire incidents through early detection, effective emergency equipment and procedures.
- Avoid high insurance deductibles.
- Lower insurance premiums.
- Ensure compliance with local codes and standards.
- Provide ease of maintenance at minimal cost.

The fire risks may not be significantly different to those in other market sectors either. There are still electrical equipment faults, ignition risks due to external factors, lighting faults, bad housekeeping and human factor risks; all can contribute to real losses. Of course there are specific risks that exist, such as mechanical equipment faults, overheating due to excessive friction or equipment malfunction, open flames and hot surfaces and process upset. Regardless of whatever fire risk exits, these must be carefully assessed and the appropriate fire detection equipment selected.

The overwhelming challenge relating to fire detection equipment however is that of its ability to withstand the conditions of the application for its life expectancy, which must include a cost consideration for maintenance.

Detection Challenges

The environmental conditions that exist in industrial facilities can present huge challenges. High levels of dust and dirt can cause malfunctions and nuisance alarms, smoke dilution in large volumetric enclosures influenced by air movement and stratification make it difficult to detect the early signs of fire. Normally-occurring background levels of smoke cannot easily be distinguished from real fire conditions and un-heated or un-cooled spaces cause temperature extremes outside of the operating range of some smoke detectors. Onsite activities such as wash downs can damage or destroy smoke detectors. In all, the many challenges a detector must face in these facilities limits the type available and their suitability to withstand these challenges.

The correct equipment selection is the first step in ensuring a fit for purpose solution.

Selecting the Most Appropriate Fire Detection

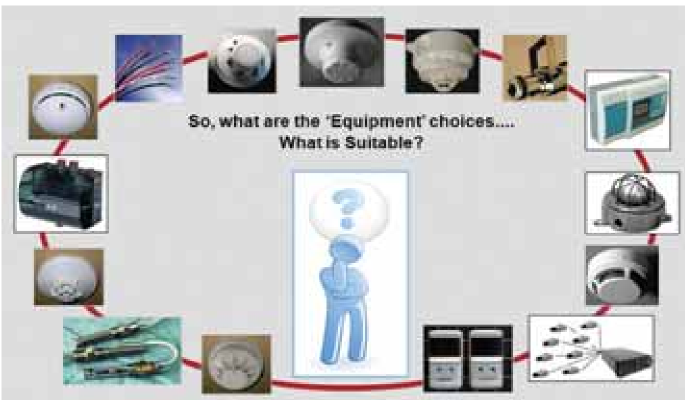
Although regulatory requirements typically stipulate where and when fire detection should be installed, ultimately the choice of detection equipment is left those who quote and are involved in the installation process. The question is: “what are the criteria for selection”?

Figure 2 outlines some of the key points to consider in order determine system suitability and the appropriate fire detection product for the job.

In relation to individual product choice, many manufactures claim their equipment is up to the task. So how then do we prioritise our choice?

Perhaps the first step is to conduct a simple evaluation? The two key points that should not be over looked and essentially form the basis for the selection of appropriate equipment, are the consequence of loss to fire and the cleanliness of the environment in which the detection equipment is to operate.

The consequence of loss to fire can equate to how well the detection system can detect a fire, that is, if the sensitivity is poor then the risk and loss will increase. In terms of the cleanliness of the environment to be protected, if the equipment chosen is unable to cope with the conditions (environment cleanliness) and operate with minimal service and maintenance then it can be deemed inappropriate for the risk.



In addition, there is the aspect of longevity. What is the likely life cycle of the product? The more difficult the environment the more robust the equipment must be. Also, the harsher the environment the more intelligent the fire detection system must be. And do not overlook the ability to maintain the system in terms of access and cost.

To best illustrate this we can look at a simple selection matrix that has been developed and can aid in the evaluation. The chart (Figure 3, next page) has been termed the "2 x 2 Fire Detection Selection Matrix". It provides a basic concept in which to view the selection of fire detection equipment for a number of market sectors and environments.

The "X" axis considers the environment, "Clean to Dirty"; the "Y" axis depicts the "Fire Risk" from low to high with consideration to detector sensitivity. There are four quadrants that represent the main fire market sectors.

The following is a brief explanation of each quadrant:

- **Quadrant 1: Generic**

The Generic Solution or Quadrant 1 can be defined as the sector where the fire industry conducts the bulk of its business, that is, the cleaner environments that are more or less considered low risk.

Typical applications include residential, commercial applications, office blocks, health care facilities, shopping centres and the like. The fire industry in general services this sector very well. Structures and applications are assessed and detection systems installed in line with codes and standards.

A variety of equipment is available from manufacturers to service this particular sector, for example, point detectors of various types, thermal detectors and beam detectors. Aspirating Smoke Detection (ASD) systems are very capable of addressing this segment and have indeed been used, although point detectors (addressable) are the most popular choice. Cost is certainly a significant factor here since compliance to minimum codes and standards is all that is required for the client. Fire contractors make their bread and butter from this sector which is very competitive.

- **Quadrant 2: High Risk**

The second quadrant the "High Risk" is the area that represents those clean environments but with high risk. Failure to respond at the early stages of a fire in these risks threatens business continuity and/or life safety. These high risk applications require suitable high capability detection with sound performance where any fire incident experienced could incur huge losses.

Depending on the application, specialist fire consultants and contractors and, in some cases, insurance will assess the risk and determine how the application is to be protected. Minimum requirements here are often above those suggested by codes and standards and 'performance based' solutions are often considered in larger facilities. Applications comprise mainly telecommunications facilities, computer and data centre facilities, semi-conductor and clean rooms and so on. Many electrical switch/substations and control rooms also fall into this category. It is also not uncommon for large open spaces and warehouses where

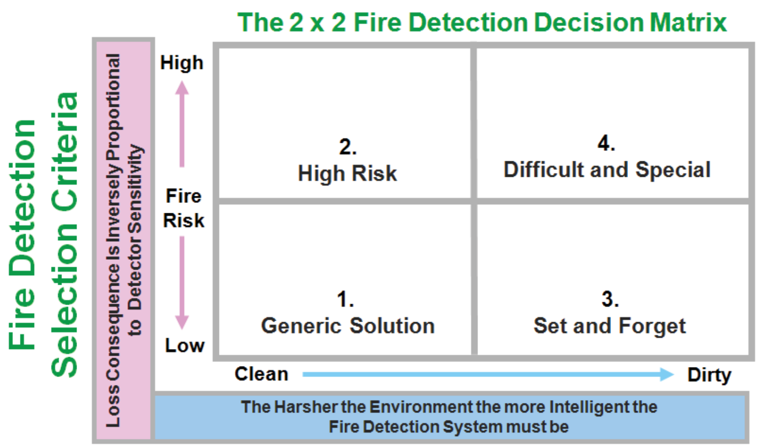


Figure 3. 2x2 Fire detection decision matrix

critical equipment or goods are stored to be considered in this quadrant.

While point detection is certainly installed in these facilities ASD is still the chosen detection solution frequently used in these high risk high sensitivity areas and where very early warning detection is paramount.

- **Quadrant 3: Set and Forget**

The term "Set and Forget" has been used here since equipment often deemed appropriate for the application by manufacturers is installed with the confidence and the impression that it will perform with minimal issues and maintenance... in essence, install it and forget it.

This solution sits in the low risk/dirty quadrant, typically the industrial sector where the challenge in these types of environments is to select a product that will provide a level of fire detection without false alarm activity. The effort expended at the concept and design stage ensures the effectiveness of the detection system.

Unfortunately, the fire industry often places too much reliance on the products used in Quadrant 3 without understanding the environmental challenges. Owners and developers may even take a 'let it burn' approach to these sites. They just want to get everybody out and pass the responsibility to the fire services and their insurers.

A wide and diverse range of industrial applications and environments can fit within this sector and this tends to be where many of the issues occur. Products considered for this sector include thermal detection, CO, beams, linear heat cable and ASD; even specially designed detectors such as multi-criteria or multi-sensors have been developed to specifically try and minimise nuisance alarms. However, since industrial working environments can be very hostile the conditions can render many of these forms of detection ineffective.

On the other hand, and contrary to the belief of many in the fire industry, a realistic and viable option for smoke detection in hostile environments is ASD. A system can be specifically engineered and designed for the application and environment with an appropriate on-going maintenance plan that can perform as intended.

- **Quadrant 4: Difficult and Special**

Perhaps the most involved sector of all in this matrix is the "Difficult and Special". The solutions in this sector are purely industrial and must be considered in line with the risk present and the environment to be protected. Any high value processes/assets contained within industries require special attention. Examples can include:

- Dusty/Dirty – flour mills, grain silos, fertiliser plants, mining, potentially explosive environments.
- Freezer/Cold rooms – damp areas – food processing.
- Corrosive – processing wash-down, battery manufacturing, chemical storage and processing.

The solution in most situations is not cheap to implement, will likely require some system engineering and will come with a maintenance requirement needed to ensure continued operation. Specifiers and end users in this segment usually educate themselves well with regard to the options available before making a decision. Once again ASD has been used quite successfully in this sector.

Matrix Summary

As previously suggested, all too frequently we see detection equipment suitable for the "Generic Solution" being misapplied and used, for one reason or another, in the other 'quadrants'. The equipment selected is installed without due thought to the application or environment or the costs associated with maintenance. Communication between the key stakeholders expressed in Figure 1 can help to avoid this misapplication.

Nevertheless, regardless of the type of detection chosen, the two key factors that should not be ignored are the consequences of loss to fire and the cleanliness of the environment to be protected. If these two factors are not considered then:

- A "Generic Solution" into "Set and Forget" results in poor detection and continued nuisance alarms.
- A "Generic Solution" into "High Sensitivity" exposes the client to increased loss through delayed detection.
- A "Set and Forget" into "High Sensitivity" results in high exposure to loss.

The "Difficult and Special" usually does not go too far wrong as the client, engineer or plant manager has a high level of involvement in the solution.

The matrix is offered as a simple means of proving some food for thought in terms of detection equipment selection and is by no means a total answer to evaluating all applications. Nonetheless, having consideration to the industrial market sector and conditions, aspirating smoke detection is a very real option and a well designed and engineered system using purpose built equipment will certainly offer a solution.

With this in mind, the next step would be to become familiar with the site, risk application and environment with the view to installing and ASD system. In the next issue of *International Fire Protection*, I plan to provide some advice with regard to the installation of ASD systems in industrial applications. IFP

Paul Leslie is Special Practices manager at Xtralis

For further information, go to www.xtralis.com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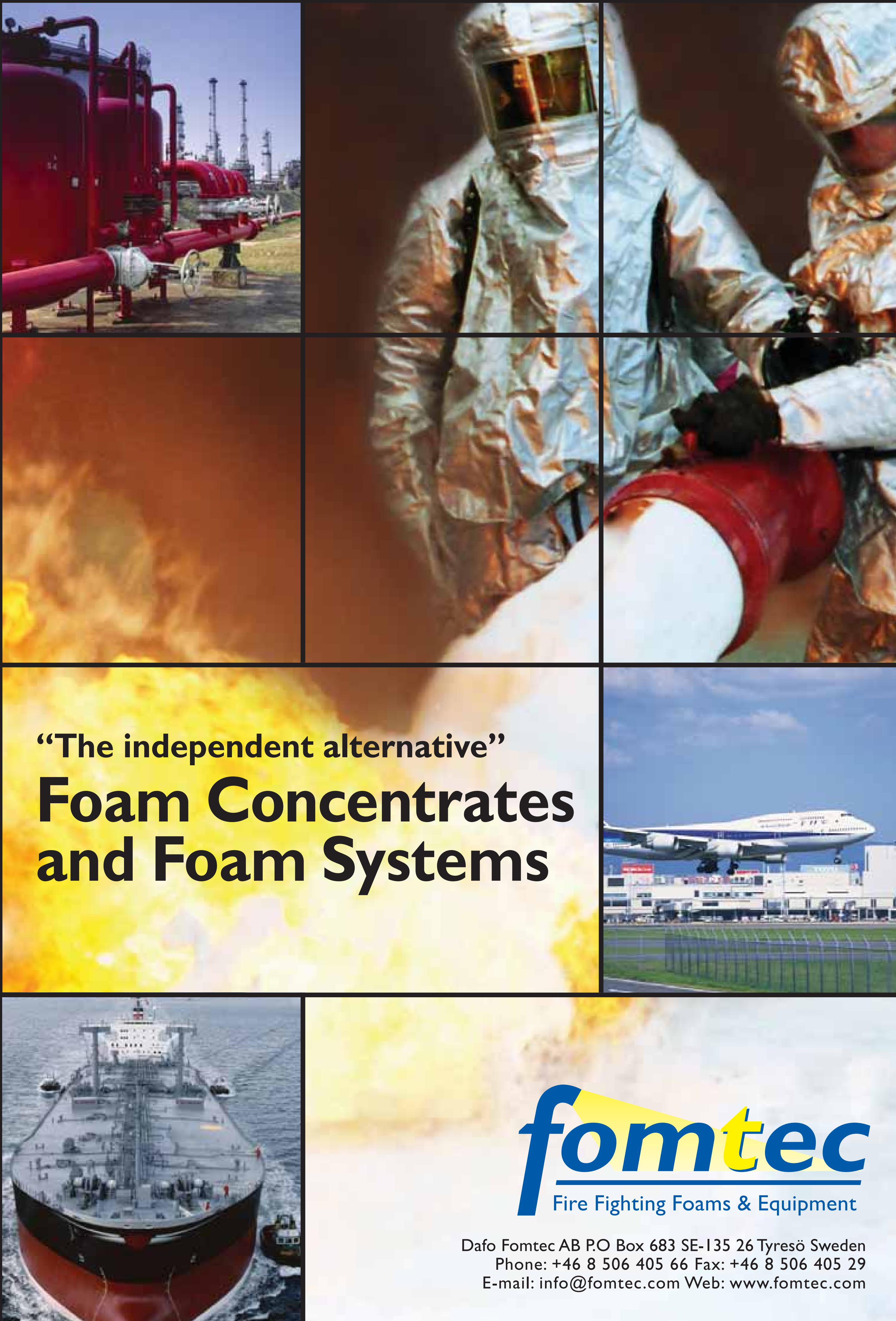
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Industrial Building Fire Prevention

Lee James

Wagner UK

All traditional forms of fire protection and extinguishing rely on a fire starting for them to work, meaning damage and disruption is inevitable. In warehouses, conventional fire protection is difficult to install and maintain. Where business continuity and stock protection is paramount a different approach is required – Fire Prevention.

These days, goods must be available around the clock – normally just in time. Modern high-rack storage areas in large centralised logistics operations are often at the heart of the solution. However, in the event of a fire, having the focus on a single logistics site increases the risk of a complete system stoppage throughout the entire supply chain. In warehouses where goods worth millions are stored, even small fires can cause enormous problems.

Large open spaces such as warehouses and logistics facilities represent one of the most demanding environments for fire protection engineers and designers. Requirements in the logistics sector continue to grow, and with them the height and capacity of the rack storage areas. Smoke, soot and water from sprinklers or firefighters can have devastating consequences, which is why even small smouldering fires can cause immense damage.

Fires that originate in the stock itself are rare. Most fires in logistics operations are caused by defects in electrical equipment, which is present in almost every warehouse. This includes switch cabinets and control boxes, electrical motors and, in deep freeze storage areas, refrigerators and defrosters. Welding work used during repairs and maintenance also increases immensely the risk of fire.

Ideal Fire Conditions

High-rack storage areas reach heights of over 40 metres. This, together with the small gaps left between the stored goods, provides ideal conditions for a fire to spread. Goods in higher racks can become heated so quickly by the rising fumes that the flames suddenly spread right up to the roof of the warehouse. This process can take only a few minutes if adequate protection is not in place. Even slight exposure to soot or smoke can contaminate the stored goods and render them unusable.

Detecting fires as early as possible is one thing – extinguishing them is another. Installation of sprinkler systems involves the fitting and on-going maintenance of extensive pipework throughout the facility. This is often very expensive for large warehouses, combined with the potential for the water-based extinguishing systems to cause damage and disruption when activated. The ultimate form of fire protection is therefore fire prevention, to stop the fire from starting in the first place.

Oxygen Reduction Systems

As everyone in the industry knows, for a fire to occur three elements need to be in place: oxygen, heat and fuel. The removal of one or more of these elements will cause the fire to be extinguished.

Removing oxygen to prevent a fire from developing is not new. Gaseous suppression systems in server rooms and the use of foam on flammable liquid fires both use the principle of smothering the fuel to prevent the fire development by removing the oxygen supply. However, for both of these systems to operate, a fire would have first to have been ignited and will have already caused damage before the process of extinguishing begins.

Oxygen reduction systems employ innovative technology that continuously reduces the oxygen level in a room by adding nitrogen to the air. The oxygen is reduced to a level in which most combustibles do not inflame and an open fire is impossible. As well as creating a totally fire-free

environment for an area, oxygen reduction systems do not prevent the area being used by people. The effects of lowered oxygen levels on the human body have been extensively researched over the years and safety guidelines have been established that allow staff to enter or work in the protected area.

Atmospheric Environment

The natural ratio of oxygen to nitrogen remains the same at high altitude levels as it does at sea level; the amount of oxygen is less because of the overall lower air pressure. The amount of breathable oxygen in a fire-free environment is similar to the amount of oxygen we would breathe in an aircraft cabin or up a mountain. But importantly the air pressure remains the same as the ambient level.

Nitrogen is used to inert the area as it is completely non-toxic in any quantity and is easily produced on site. Other benefits of Nitrogen are that it is electrically non-conductive and will not harm any product stored in the area. The Nitrogen being fed into the risk area is in fact fresh air with a 95 percent Nitrogen content. This prevents the air within the risk area from becoming stale and also prevents a build-up of carbon dioxide.

The Nitrogen is not stored in pressurised bottles, but produced as required by the oxygen reduction system to replace natural leakage in the risk area. This allows accurate control of the atmosphere within the risk and saves space. The equipment footprint for oxygen reduction systems is typically much less than comparable extinguishing systems.

Cold Storage Areas

The operation of conventional fire protection systems can be adversely affected in deep freeze storage areas. Despite a temperature of –26°C, there is a pronounced fire risk in these areas because of the extremely dry air. At the same time, fire detection and fire extinguishing prove problematic. Condensing humidity and the minus temperatures adversely affect the function of conventional smoke detectors, which typically operate only down to around –20°C. Extinguishing fires with firefighting water containing antifreeze contaminates the goods in food warehouses.

Inside high warehouses with such low temperatures heat rises only very slowly in the first phase of a fire because of the low thermal lift. As a result of this, conventional fire extinguishing systems often are not activated before the fire has already taken hold.

Oxygen reduction technology and appropriate aspirating smoke detection equipment is not affected by any of these conditions or problems.

Field Proven Applications

Oxygen reduction systems are now field proven in a number of applications ranging from small IT rooms, museums and archives, through to warehouses of 600,000m^3 and more. For example, Wagner's OxyReduct system has been adopted by over 600 organisations worldwide. IFP

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Fire Engineering – Bigger Picture

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The built environment is changing at a faster pace than at any other time in history. Today, more and more buildings are being designed by architects using novel engineering solutions and innovative and previously untried products and materials. At the same time – and perhaps as a result of this shift – our city skylines are being punctuated by structures that have abandoned the "old rules" and are being conceived and built to engineering principles rather than to hard and fast rule-book solutions.

In terms of fire safety, this remains largely uncharted territory for many architects, even for some fire detection, alarm and suppression companies, and certainly for the vast majority of business men and women. The term "fire risk assessment" has now well and truly entered the fire fraternity's vocabulary. Indeed, to some it has become the "be-all and end-all" of fire safety; once a fire risk assessment has been completed, they consider they have satisfied all of their obligations; problem solved.

The need to carry out a fire risk assessment is not the issue being challenged. Indeed, carrying out a proper and exhaustive fire risk assessment and then, equally importantly, regularly updating it is vitally important. But, the fire risk assessment should be the starting point for many buildings, not the sigh-of-relief conclusion.

The concern felt by many leading fire engineers is that this focus on fire risk assessment is causing what might be describe as fire safety myopia. It is stopping many organisations from seeing the bigger picture when it comes to fire safety. When deciding that the successful completion of a fire risk assessment fulfils the fire safety needs, they are taking what might be reasonably considered to be a tactical approach, whereas what is needed in many instances is a broader strategic attitude to fire safety – one that can be provided only by a qualified and suitably experienced fire engineer who can apply scientific and engineering principles to the challenge.

This does not necessarily apply to all companies and every building. For a straightforward building it may be an acceptable outlook, but certainly not for larger buildings, complex structures, high-hazard environments, high fire load structures and buildings with intricate evacuation procedures. This group certainly includes public assembly buildings such as leisure centres, entertainment venues, hotels and holiday resorts. In such cases, not only should undertaking a fire risk assessment be entrusted to a qualified fire engineer; a professionally conceived fire strategy is also essential as the only way to adopt a more all-embracing view of the overall fire safety environment.

Taking an Holistic Approach

So it is essential that we move beyond the misguided notion that anyone with a few years' experience in the industry is competent to conduct just about any fire risk assessment, or that the assessment is all that is needed.

What is being arguing is that an essential part of the holistic approach to fire safety is the need for each building to have an overall fire strategy. This will provide a clearly defined fire safety landscape; one that integrates all of the passive and active elements of fire prevention and life and property protection measures with how the building functions in terms of fire safety. This fire strategy should contain comprehensive details on all of the assumptions and philosophies that led the fire engineer to formulate the fire safety design and procedures. This should include any

The concern is that the focus on fire risk assessments is stopping many organisations from seeing the bigger picture when it comes to fire safety. When deciding that the successful completion of a fire risk assessment fulfils the fire safety needs, they are taking a tactical approach. What is needed in many instances is a broader strategic attitude to fire safety – one that can be provided only by a qualified and suitably experienced fire engineer who can apply scientific and engineering principles to the challenge.

Seeing the

assumptions regarding the possible future change-of-use, management and maintenance of the building.

This is particularly important on new-build projects and buildings that are designed on fire engineering principles because, without an effective fire strategy, the design team will neither have a clear understanding of the fire safety and protection philosophy, nor fully understand the effect that the fire engineer's strategy has on the building design. It is a widely held, but nevertheless inaccurate, misconception that architects are primarily concerned with the aesthetics of a building, the creation of beautiful spaces and stunning structures. While this is an implicit part of their work, they are also equally concerned with creating environments that are fit for purpose, so they are also heavily involved with the operational and safety aspects of the building.

Strategy Guidance

At first glance, devising a building's fire strategy may appear to be a daunting prospect and, without following certain guidelines, it is nearly impossible to compare one strategy with another. Certainly, if key factors are not to be missed and incorrect assumptions made, it does have to be devised by a competent and suitably experienced fire engineer who has an understanding of fire, its effects, the reaction and behaviour of people to fire, and how lives and property can best be protected.

Increasingly, hotels, holiday resorts and leisure centres are being designed on fire engineering principles, and this demands considerable experience and technical expertise on the part of the fire engineer devising the strategy. It is in this type of structure or complex that risk factors can be so easily missed, and gaps in the fire safety arrangements that were not picked up in the fire risk assessment may appear only when disaster strikes.

While the completion of a fire risk assessment, and its regular updating, may well satisfy certain of the building owner's and occupier's responsibilities, a properly devised fire strategy can be expanded to embrace aspects of fire safety that are outside the boundaries of any regulations. Its primary aim is to design, plan, manage and co-ordinate appropriate fire safety procedures to reduce the risks of fire, ensure the safety of the occupants, achieve safe evacuation, and protect the building.

While the completion of a fire risk assessment, and its regular updating, may well satisfy certain of the building owner's and occupier's responsibilities, a properly devised fire strategy can be expanded to embrace aspects of fire safety that are outside the boundaries of any regulations. Its primary aim is to design, plan, manage and co-ordinate appropriate fire safety procedures to reduce the risks of fire, to ensure the safety of the occupants, their safe evacuation in an emergency, and the protection of the building and other, possibly neighbouring, assets. In this way, it can be used to provide well-founded proof of the building's safety for the statutory authorities, the building's insurers and the businesses' stakeholders.

Having a fire strategy means that fire risks and hazards can be substantiated by the rational of the fire strategy; subsequent fire safety audits will be able to validate the rational of the fire strategy and confirm or question the findings of the fire risk assessment. Additionally, enforcing authorities will be able to understand the reasoning behind the fire safety measures, and the findings of the fire risk assessment.

For example, the seemingly unrelated decision to replace hard laminate flooring in a public assembly area with soft, sound-absorbing carpeting can have a major impact on the acoustic performance of a voice alarm/evacuation system. An additional concern when considering a voice alarm/evacuation system is language; English is not everyone's natural tongue. Another consideration is, in a holiday resort for instance, the age profile of the building's guests. Elderly people may be hard of hearing, possibly partially disabled, and slower to respond than people in their twenties, thirties or forties.

Real World Perception

In reality, many organisations probably do have what they consider to be a fire strategy. However, in practice, this frequently turns out to be little more than an unconnected collection of fire, health and safety, security and disability discrimination related documents and policy statements. Certainly, far short of a coherent strategy that – with the right professional help and guidance and the adoption of a proper framework – could be in place safeguarding the prosperity of the business and the health and wellbeing of the employees. IFP

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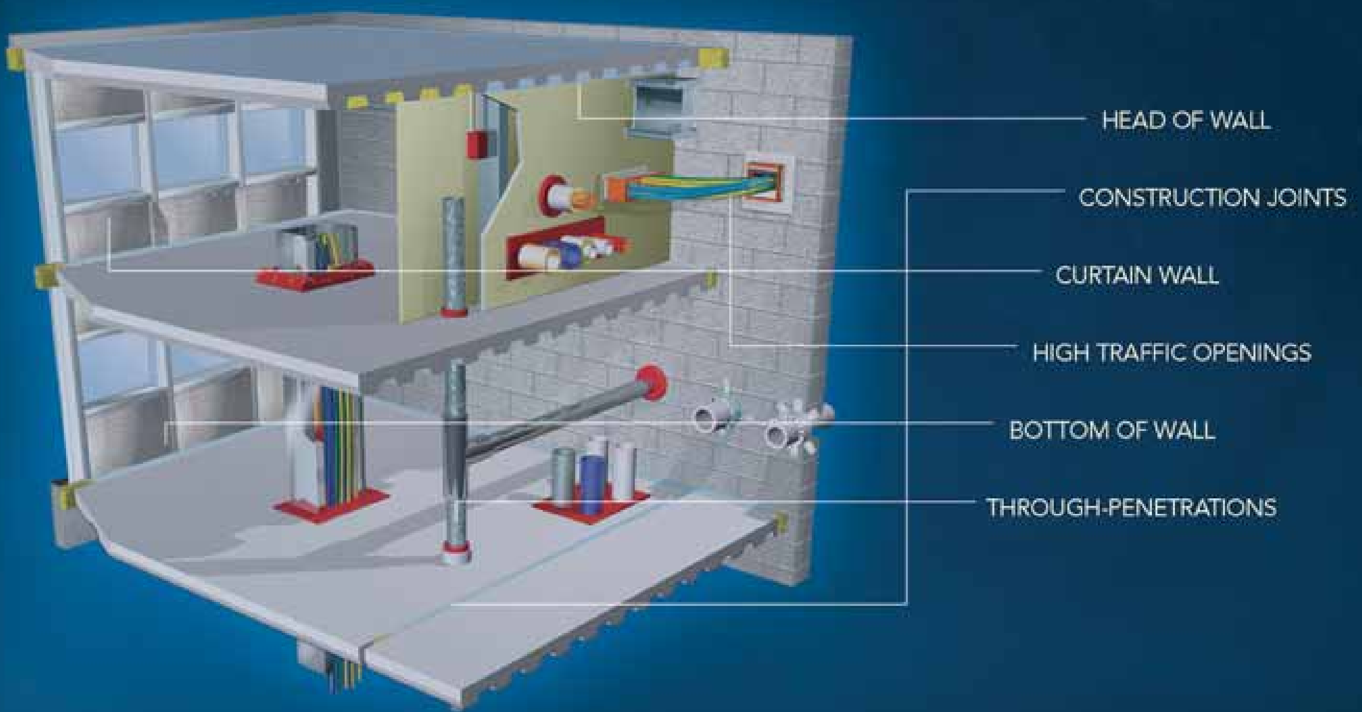

Club Kiss' only means off egress

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Fire Safety in Brazil

Is the Country Ready to Host the World Cup and Olympics?

With millions of tourists and spectators expected to travel to Brazil for the upcoming 2014 FIFA World Cup and the 2016 Games of the 31st Olympiad, many questions remain about the host country's commitment to life safety and fire protection.

On the heels of the country's worst nightclub fire tragedy (Club Kiss) that claimed 239 lives in the town of Santa Maria, Rio Grande do Sul, local and foreign public confidence in Brazil's life safety and fire protection legislation is at an all time low.

The focus of this article is not on multi million dollar projects that have been undertaken by the country for the Word Cup and Olympics, but to shed light on the level of life safety and fire protection of the surrounding existing and aging infrastructure such as hotels, restaurants, bars, and nightclubs that will serve the millions of people attending these events.

Most tourists feel a sense of security when having dinner at one of the thousands of restaurants in Sao Paulo, taking the family on vacation in one of Rio de Janeiro's finest hotels, or dancing the night away at a night club in Curitiba. The sense of security comes with the notion that such

Town of Santa Maria in the State of Rio Grande do Sul

a place of business would not be allowed to operate unless it was built and maintained to the standard of care expected of a rapidly growing country like Brazil. That is, patrons to these businesses are not worried about their safety while frequenting them because they trust someone already has. This is not the case for most of the country's aging buildings and businesses.

The question of adequate life safety and fire protection in Brazil is a complex one to answer, but change needs to happen at three levels: national and local building code legislation, enforcement, and owner accountability.

Unfortunately, Brazil has a weak federal regulatory agency that is not specifically dedicated to fire protection and life safety. Currently, national Brazilian codes (Normas Brasileiras Regulamentadoras – NBR and Normas Regulamentadoras NR) are developed and revised by the Associacao Brasileira de Normas Tecnicas (ABNT) and the Comite Brasileiro de Seguranca (CB 24). The development of codes and standards in Brazil by these organizations is based on the adaptation, translation, and combination of the International Organization for Standardization (ISO), National Fire Protection Association (NFPA), British Standards (BS) and other less recognised entities from around the globe.

An example of governing federal regulations is the NR 8, which establishes the minimum level of safety and comfort for building to be utilised as a place for work; similar to the International Building Code (IBC) regulation, and NR 23, which establishes the minimum fire protection requirements for a place of work; similar to NFPA 101, Life Safety Code (for business occupancy).

Examples of Brazilian codes/standards related to life safety and fire protection are as follows:

- NBR 9077 – Building Emergency Exits.
- NBR 9441 – Fire Alarm and Detection Code.
- NBR 12693 – Fire Extinguisher Code.
- NBR 13794 – Standpipes and Hose System Code.
- NBR 10897 – Automatic Sprinklers Code.

It is important to note that Brazil, like the United States, is sub divided into states.

In addition to the codes and standards developed and/or adopted on an organisational or national level, other legislation exists at the state

and local level. These include, state level legislation amended by the fire department (Corpo de Bombeiros), and municipal codes which are mainly focused on construction enforced by the Building Department (Secretarias de Habitacoes/Obras). It is important to note that although similarities exists between the Brazilian "Corpo de Bombeiros" and United States fire departments regarding enforcement of codes and standards, the level of knowledge and resources related to the same differs tremendously, with the United States having the luxury of organisations such as the National Fire Protection Association (NFPA) and Society of Fire Protection Engineers (SFPE).

Enforcement of building codes and standards, like the United States, begins during the project or design phase of a structure such as a building. It is the responsibility of the project or design team to make sure that all national, state, and local regulations are met for life safety and fire protection. In addition to professional responsibility by the project or design team, the building department must approve the building before construction can begin. Based on the age and code compliance of buildings and structures scattered throughout Brazil, it is evident that life safety and fire protection enforcement at this level could and should be improved. The example of Club Kiss stands out, where one means of egress was provided for what is reported as a business with a 1,000 person occupancy limit (it has been reported that at the time of the fire an estimated 2,000 people were inside the overcrowded club).

The question of adequate life safety and fire protection in Brazil is a complex one to answer, but change needs to happen at three levels: national and local building code legislation, enforcement, and owner accountability.

Based on preliminary information gathered by local investigators and what has been reported by the media, Club Kiss was equipped with flammable acoustic insulation, one means of egress (front door – size unknown), and no fire alarm and sprinkler system, which was the perfect recipe for disaster.

Brazil's law enforcement officials have had plenty of examples of tragic nightclub fires similar to Club Kiss over the past ten years to not let a tragedy like this happen in their own country. The most notable example in the US is the 2003 fire at the Station Nightclub located in West Warwick, Rhode Island that claimed over 100 lives. The cause of the fire stemmed from the use of pyrotechnics by the nightclub's entertainment, and prompted quick revisions by American law makers to existing fire protection and life safety regulations for nightclubs. Other similarities included the use of flammable acoustic insulation and the lack of a fire alarm and sprinkler system.

For example, if Club Kiss was located in the United States, it would be considered an Assembly (A 2) occupancy, which by building codes (International Building Code – IBC) would require three separate and remotely located means of egress

Station Nightclub post-fire

(exits) for an occupant load of 500 1000 persons (four exits if the occupant load was 2,000 people as reported by the media in the Club Kiss fire). In addition, the nightclub would be required to be equipped with a fire alarm system (with voice evacuation), as well as an automatic sprinkler system. The sprinkler system requirement threshold in the model codes was lowered as a result of the Station Nightclub fire. These code revisions, which were adopted by all 50 US states, require that nightclubs with an occupant load of 100 or more persons be equipped with an automatic and supervised sprinkler system.

For the most part, we would like to live in a world where building and business owners spend the maximum amount of attention and money to protect its occupants and/or patrons. Unfortunately, we do not; most often building owners will opt for the minimum level of safety to be achieved so as not to spend additional money from their budget, which could be spent on aesthetics or operational infrastructure.

For their part, building and business owners are not experts in life safety and fire protection, but have a social responsibility to ask the hard questions related to such. That is, they should have the awareness to ask questions related to their buildings and business to assure that patrons and occupants are protected in the event of an emergency such as a fire.

The example of the Club Kiss fire raises questions related to what the owner knew about the night of the incident. Was he aware that the building would hold as many as 2,000 persons as reported, and that the band would utilise pyrotechnics for the show? Is he at fault for running a business that, which like so many others in Brazil, are not equipped with proper life safety or fire protection system, but yet are given permits to operate? Would an owner even understand the nuances between different types of acoustical foams with radically different flame spread characteristics? These are questions which will be answered most likely in a court of law and the court of public opinion, but this is the time for owners of similar facilities in Brazil and around the world to be accountable, look in the mirror, and do something about it.

Brazilian state map

Regardless of blame, law makers need to drastically change the landscape of life safety and fire protection as it relates to assembly occupancies (and others) in Brazil. Changes similar to the ones that came after the Station Nightclub fire need to take place and be enforced. After new regulations are revised and/or created at the national level (federal in Brazil), local officials need to develop an enforcement initiative to put nightclub (and other business) owners on notice; they will have a specific period of time in which to make the changes to improve life safety and fire protection, and if not compliant; their businesses will be closed until compliance is achieved.

The public is looking for a villain and the media is looking for a storyline, but the solution to this problem will not come overnight for Brazil and if dramatic changes are not made, they will not come in time to provide adequate life safety to the millions of tourists visiting one of the most beautiful countries in the world for the World Cup and Olympic Games. IFP

Most tourists to Brazil feel a sense of safety and security when visiting the many restaurants or hotels in Sao Paulo. Visitors to these businesses are not worried about their safety because they have a sense of security that comes with the notion that such a place of business would not be allowed to operate unless built and maintained to the standard of care expected of a rapidly growing country like Brazil.

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Sprinklers – The Best is yet to Come

Alan Brinson

European Fire Sprinkler Network

Over the past ten years Europe has seen great strides in the recognition of sprinkler systems and sprinkler technology. But, what is yet to come?

A decade ago, the European Fire Sprinkler Network began to campaign for the wider use of sprinklers in Europe. Now is a good moment to take stock of what has been achieved and what the future may bring. We have seen great advances in European fire safety codes, sprinkler standards and sprinkler technology. These advances are set to continue.

Since 2003, most European countries have introduced requirements to fit sprinklers in high-rise buildings, typically at a threshold of 20 metres to 30metres, corresponding to the height above which the fire brigade cannot intervene externally. There are exceptions, notably France where the threshold is 200 metres. Sprinklers are now required, or strongly incentivised, in shopping centres and large warehouses in most countries, although again there are some surprising exceptions, such as warehouses in the UK.

In Europe fire safety codes and regulations are a matter for the different national governments, much as in the US where they are a matter for the individual states rather than the federal government. Unlike in the US, there are no consensus model codes drawn up by third parties like the NFPA or ICC. Instead, each government has its own arrangements and in most cases fire safety codes are drafted by government officials.

In most countries there is one national set of regulations but in a number of countries there can be regional variations, such as in the UK, which has separate jurisdictions in England, Northern Ireland, Scotland and Wales; and in Germany where each of the 16 states has its own fire safety

codes. This patchwork of varying regulations means that fire safety varies considerably across Europe and we see huge variations in fire death and injury rates. While some would like Europe to introduce a degree of consistency, ideally to bring the weaker countries up to the level of the best, under the Lisbon Treaty the European institutions have limited scope to act.

That said, in 2004 the European Commission published a Directive on fire safety in road tunnels that prescribed a set of organisational and passive fire protection measures. Sprinklers were not mentioned but, at the last moment, a clause was added to permit alternative solutions. Today most large, new road tunnels in Europe seriously consider fixed fire suppression and there is a growing reference list of European road tunnels protected with sprinklers or water mist. This trend is being mirrored in the US, where NFPA 502 now recommends sprinklers in long, busy tunnels.

The only other European attempt to introduce a consistent approach to fire safety in buildings was in hotels, where in 1986 a recommendation on fire safety in existing hotels was published. It was overly prescriptive, difficult to apply to existing buildings, did not mention sprinklers and was widely ignored. After several unsuccessful attempts at improvement that failed because of a lack of political support from national governments, the European Commission is now considering the publication of a green paper to set out the options and canvas opinion.

Meanwhile, at a national level regulators across Europe are increasingly recognising the life-saving benefits of sprinklers. Starting in northern Europe, we have seen new requirements to fit sprinklers in high risk residential buildings, such as care homes and high-rise apartment buildings. Norway is leading these developments, with sprinklers required in new hotels, hospitals, care homes and apartment buildings of more than two storeys. A law has been passed in Wales in the United Kingdom to require sprinklers in all new housing. The Welsh government recently published its plans for public consultation, making clear that it expects this requirement to take effect in the spring of 2014.

While the first domestic sprinkler ordinance dates from 1978 in San Clemente, California, Wales would be the first country to require sprinklers in all new housing. In most countries in Europe fire safety building regulations or statutory guidance is built on compartmentation and means of escape. Sprinklers are being recognised as an alternative measure to make buildings safe from fire, often offering an approach that is more economical and enables designs with larger compartments, longer escape routes or less generous fire brigade access, all of which would otherwise not be accepted.

As a result of all these welcome developments more new buildings in Europe are being fitted with sprinklers and they are safer for it. However, most new buildings are still not sprinklered and there is much to do. Too many people in positions of influence are unaware that sprinklers almost eliminate fire deaths and reduce fire injuries and property losses by over 80 percent. Similarly, they are unaware that sprinklers respond individually to heat and that most fires are dealt with by just one or two sprinklers.

One of the principal barriers to new code requirements for sprinklers is the perception by regulators that sprinklers are expensive. CEN Technical Committee 191 is addressing this with two revisions to EN 12845, the European sprinkler system design, installation and maintenance standard. These revisions will at last bring the standard into the 21st century, recognising sprinklers and sprinkler system designs that bring down system costs.

Among almost 70 pages of changes, the first revision introduces K160, ESFR and CMSA sprinklers; it provides updates to some of the storage tables including how to deal with excessive clearance; it specifies the equipment to be installed and how it should be used to conduct pump pressure and flow tests and it sets out requirements for pump cabling. In addition the controversial title for Annex F, “Special requirements for life safety systems”, will be replaced with the more accurate, “Additional measures to improve system reliability and availability”.

All sprinkler systems are capable of saving lives and the excellent historical record of sprinkler systems is based on systems that did not include these additional measures. Moreover, systems installed in houses and apartments are primarily installed to save lives yet are designed to different, more economic standards, so the old title of Annex F was causing confusion. The first revision of EN 12845 should soon go to the national members of CEN for approval.

The second revision of EN 12845 is a more thorough review of the standard and will revise the sequence of chapters, introduce design guidance for high ceilings, reflect the latest storage technology and under hazard classification define 80 percent of the most common hazards so that designers adopt a consistent classification for a school, hospital and so on. The first draft of this revision is expected to go to the national members of CEN for comments early in 2014.

The scope of EN 12845 does not include houses, apartments and other residential buildings. CEN has formed a committee that is drafting a standard for these applications. The draft document will draw on the decades of positive field experience in North America and take account of the very different methods of construction common in Europe, where in many countries wood is not used in construction, piping for apartments is cast in concrete and lofts

are reached by a permanent staircase. To complement this system design standard, CEN will publish a residential sprinkler component standard, EN 12259-14. It is based, under licence, on UL 1626, the standard to which the residential sprinklers now on the market have been tested.

Two of the most controversial technical issues faced by sprinklers in recent years are freeze protection and corrosion. Real fire experiences in the US with anti-freeze, as well as research, have shown that concentrations of combustible anti-freeze must be limited more than they have been in the past. Moreover, to guarantee proper mixing, NFPA now requires combustible anti-freeze to be supplied in pre-mixed, listed solutions. It is unlikely that the matter will rest there and we can expect the industry to launch new technologies to deal with the problem of fitting sprinkler systems in areas prone to freezing.

One approach is to fit a dry pipe system. However, field experience in Germany, where all sprinkler systems are inspected after 25 years, showed that significant corrosion is considerably more frequent in dry pipe systems, even if the pipe is internally galvanised. As a result dry pipe systems are inspected after 12½ years. That dry pipe systems are more prone to corrosion is perhaps not surprising given that the pipe network is pressure-tested with water when first installed, then drained and filled with compressed air. Despite all efforts to drain the water, the atmosphere is moist and in the presence of compressed air corrosion can occur.

For this reason the largest German installer now voluntarily fills all new dry pipe systems with nitrogen. While corrosion is usually far less serious in wet pipe systems, it can occur and a number of suppliers now offer treatments or piping solutions to minimise it. Others offer sprinkler piping systems in corrosion-resistant CPVC or stainless steel. As well as their improved corrosion resistance, the most important advantages of CPVC and stainless steel are that they can be installed faster, more cleanly and quietly in buildings such as hotels where long lengths of prefabricated pipe cannot be used, or in existing buildings where the sprinkler pipe has to be installed around unexpected obstacles.

Sprinkler manufacturers and other component suppliers invest considerable sums in research and development and each year launch new products and concepts to make sprinklers more efficient. It would not be appropriate to attempt to list all their innovations but aside from advances in piping, we have seen new storage sprinklers which:

- Protect larger areas.
- Protect warehouses of increasing height without in-rack sprinklers.
- Reduce the system hydraulic demand and thus the costs of water supplies.
- Protect refrigerated warehouses using dry ESFR or CMSA sprinklers.

Sprinkler manufacturers are also improving the aesthetics of sprinklers, with lower profile (more compact) sprinklers, flush (barely protruding) sprinklers and a much wider range of concealed sprinklers. Today the sprinkler system designer can make use of pendant, horizontal sidewall and extended coverage concealed sprinklers for the discreet, efficient protection of hotels and heritage buildings.

It is not only sprinklers that have improved their offering. Alarm valves are now lighter, more compact and more neatly and simply trimmed than in the past. They are also available in stainless steel and other materials for corrosive environments. Pumps have remote monitoring and testing capabilities and recycle all water, including that for engine cooling, so that their environmental footprint is reduced.

In apartment buildings in some countries the sprinkler system uses the potable water supply, which offers sufficient flow and pressure for a residential system. Not only is the potable water supply extremely reliable and tested many times every day by the residents, its use to feed the sprinkler pipe to an apartment saves the costs and space required for a tank and pumps. Whether the sprinkler system may be directly connected to the water mains depends not only on whether there is sufficient pressure and flow available but also on whether the water provider will permit a direct connection. In Germany direct connections are not allowed while, across the border in Switzerland, they are compulsory. Switzerland has never had a sprinkler system failure.

While the sprinkler market closely follows the construction market and is therefore depressed in some countries, we nevertheless see that an increasing proportion of new buildings are fitted with sprinklers. This is due to a growing recognition among regulators, owners, risk managers and fire safety consultants of the benefits of sprinklers for saving life and for doing so more economically than other, traditional approaches. To encourage this regulatory recognition, the sprinkler industry is modernising its standards and introducing new, more competitive technologies to make sprinkler systems more affordable. This is a virtuous circle that will benefit us all. IFP

Alan Brinson is Executive Director of the European Fire Sprinkler Network

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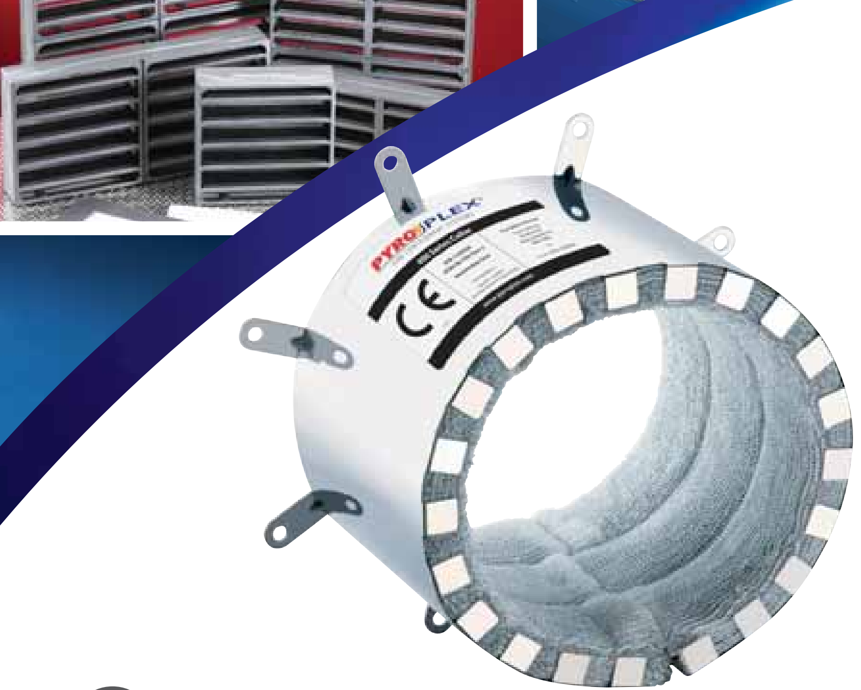

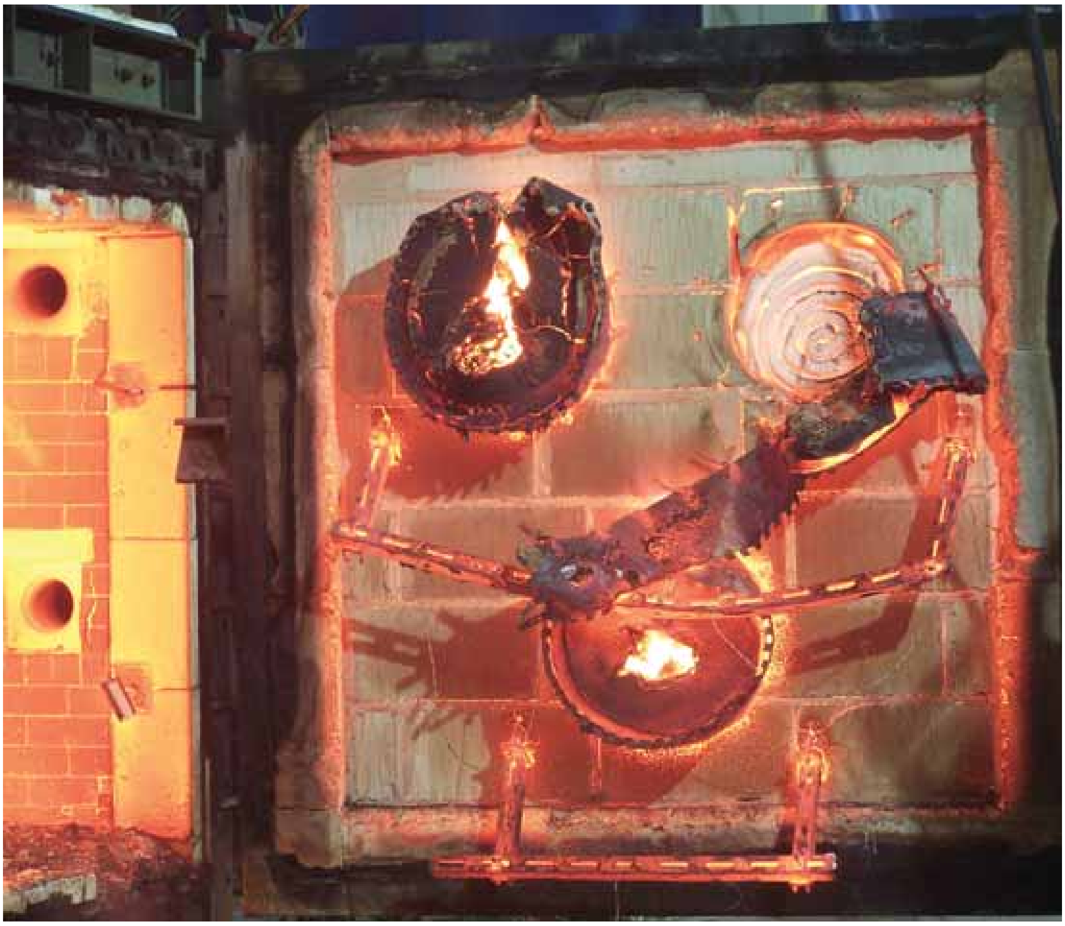

CE Marking & Penetration Sealing

Andy Walsh

Pyroplex

On the 1st of July 2013 the Construction Product Directive (CPD) will be replaced by the Construction Product Regulation (CPR).

Whereas the CPD lacked clarity as to when products had to be CE marked, the CPR identifies all products that can be CE marked when they can demonstrate compliance with a CEN (EN) product standard or an EAD (previously ETA). They can then carry the CE mark at the point of sale or installation. Implementation by 1st July will be a tight schedule that may have some manufacturers struggling, not just in the UK, but across Europe. The history of CE marking on fire sealing products portrays some of the complications encountered.

Back in 1985, the European Commission published a White Paper that set the target of abolishing all barriers to trade across the member states of Europe. These barriers included technical, physical and tax-related barriers that could prevent companies in one member state from selling their goods in another member state. These barriers were meant to be removed in the following seven years and 1992 became the major target, with numerous Government publications being circulated putting form to the objectives and stressing the need to have certain tasks completed by that year.

The Commission believed that a single common market; a market that was satisfied by products that displayed similar properties and performance characteristics, was a necessity if any member states' companies were to produce products that were competitively priced as a result of the economies of scale, which will accrue if the market size is large enough. The Commission visualised that if European companies were to gain an equal share of the global market for products, production levels would need to match those of other

CE MARKING

major areas of the world, for example, the USA and China.

It was stressed that while it was deemed important that the product properties were similar to permit comparison throughout Europe, there was absolutely no intent to harmonise regulations. The harmonisation was restricted to the properties governing fire behaviour so that when fire resistance, or ignitability were called up in member states' regulations, the criteria to be satisfied are the same across Europe, regardless of whether the product was produced and tested in Germany, the UK, Greece or wherever.

Each European country could call up different durations of fire resistance or levels of flame spread as befits the risk associated with their building stock, but the criteria shall be measured in a similar way. The first stage in this harmonisation process was to generate a whole raft of harmonised fire tests that the member states could adopt in their regulations and for which they could find equivalence in their national requirements.

During the same period, the Commission defined what the essential requirements were for a building; the second of which is 'safety in case of fire'. It was stressed that any construction product does not exhibit dangerous behaviour when exposed to fire and must also make a positive contribution to fire safety when designed to do so.

Having defined the performance requirements using the criteria given in the harmonised fire tests (as produced by the European Technical Committee – TC127), the Commission then identified that the Community did not only require harmonised performances against harmonised test methods, it needed harmonised product standards which could identify which of the essential requirements were considered necessary to be satisfied by the products for which appropriate test procedures had been produced.

All of the above activities took place under the mandate of the Construction Product Directive (CPD), but there was confusion within the Commission/member states as to whether all construction products had to satisfy the CPD and whether they all needed to be marked with the, now increasingly seen, CE mark. This mark is now meant to identify that the product satisfies all of the relevant essential requirements that had been identified in the product standard as being critical. We most commonly see the mark on electrical goods to identify its compliance with the Electrical Equipment (Safety) Regulations 1994, but with construction products it is far more complex and if a product is to be CE marked, it has to demonstrate that it satisfies a much wide range of essential requirements, as follows:

1 Mechanical resistance and stability.
2 Safety in case of fire.
3 Hygiene health and the environment (release of fibres, etc.).
4 Safety in use.
5 Protection against noise.
6 Energy economy and heat retention.

Whilst some of these are not relevant and can be labelled as 'no performance' determined, there are obviously more facets to consider than with electrical goods.

However, the CPD has lacked clarity as to when the products had to be CE marked and few, if any; manufacturers were preparing to mark their products. On the 9th of March 2011 it was announced that the CPD was to be replaced by the Construction Product Regulation (CPR), which would definitely identify that all products can be CE marked if they can demonstrate compliance with a CEN (EN) product standard or an EAD (previously ETA) then they can carry the CE mark at the point of sale or installation. This will be implemented by 1st July 2013, giving manufacturers a challenging, if not real struggle, to comply by this date.

However, Pyroplex has applied significant resources to have its pipe collars and pipe wraps CE marked well in advance of the recommended date. This is notable for a number of reasons. One of the primary objectives was that the companies that manufacture product for use throughout Europe would grow to a size able to take on the global market. But there was a tendency to believe that only large conglomerates would be able to resource achieving this status. Pyroplex certainly 'bucks that trend' while being a substantial company, it would not normally attract the title of 'a conglomerate'. Therefore, as a UK medium-sized enterprise, Pyroplex has achieved the ultimate objective of meeting the requirements that should drive its products further into the world market.

The specialist area in which Pyroplex operates, the manufacture and supply of fire sealing products, is one of those markets where there were also inordinate delays in the preparation of the necessary testing procedures and/or technical approval documents. These delays were overcome by taking an active role in the drafting process for such documents. This meant that Pyroplex sat alongside the stakeholders from the construction industry, that is, standards writers, regulators, notified bodies and certification agencies in the UK and Europe, and drew up the missing documents that were then sent out for review, public comment and final editing. This process is robust and ensures that the published standards and approval documents incorporate the correct procedures to demonstrate compliance with the relevant 'essential' requirements.

Participating in this process gave Pyroplex a head start in getting its products onto the market carrying the CE marking that the Construction Product Regulation will make mandatory. IFP

Andy Walsh is Technical Manager at Pyroplex

For further information, go to www.pyroplex.com

Intelligent Glass D

Pic copyright Graham Collins

For most functions of glass – such as energy and light control – an often too glib familiarity is of little consequence. But where fire is a question, the issues are serious ones and complacency is unjustified. Lives are potentially at stake and there may well be major consequences in horrendous costs for building owners and businesses.

Mike Wood

The prime property of glass – its transparency – is a major potential drawback in developed fire conditions. Even if glass stays in place, dangerously high levels of heat can be transmitted by conduction and direct radiation, with additional contributions from re-radiated and convection from a hot glass surface on the non-fire side. That in turn risks secondary fire generation and the production of smoke from smouldering floor coverings, producing a very hot un-breathable, choking atmosphere. In an enclosed environment – such as internal escape ways and lobby areas – transmitted heat can therefore cause unpleasant, untenable conditions, which create unacceptable risks for those trying to get out of the building.

An understanding of glass behaviour in fire is therefore essential for the designer and specifier. Standard glass products are vulnerable to the smallest of fires, and cannot survive intact for any practically safe length of time. In turn, that should lead to an appreciation of the principles of fire-resistant glass and glazed systems so that fire-resistant glass can be used efficiently and effectively within a dominant transparent design concept.

Designer Choice

Where fire safety in glass construction is concerned the designer is faced by essentially four levels of choice, and accordingly four very different levels of risk.

- The first option is to minimise the use of fire-resistant glass barriers to the minimum, placing reliance implicitly in a faith that fire will not break out and that the fire load can be controlled to minimise the extent of likely fire damage. But good practice modern fire safety relies on integrated fire safety, dependent on interlocking different fire safety systems in an holistic fire safety concept. This choice requires a high degree of confidence that the design and its implicit assumptions are faithfully reproduced as intended through the (usually complex) supply and build chain where cost considerations too often dominate over technical performance considerations, also that the occupation of the building in its lifetime keeps in line with the original design concept – without significant change to use, layout and fire load in a way that conflicts with the basis of the design blueprint.
- Standard glass products such as tempered – that is, toughened – glass may be used perhaps in combination with sprinklers as substitute fire barriers. This is a high risk option since tempered glass and water do not combine well under fire conditions. There should be no illusions: tempered glass may fail catastrophically and without warning in the face of fire due to

esign

thermal stress and shock. Commercially produced tempered glass is not produced consistently enough, with sufficient attention to the critical detail that affects sensitivity to failure. Designers may consider that the use of standard pvb (polyvinylbutyral) safety laminated glass presents a lower risk option – only to replace one critical mode of failure in fire with another. Such laminated interlayers burn vigorously and catastrophically when exposed to heat from a fire, within ten minutes of flame exposure. In the event of fire, chance may substantially determine the outcome. If the flow of water is not complete and continuous over the whole glazed area then there is likely to be a heightened risk of glazing panel and assembly failure.

- Integrity fire-resistant glass can be used to hold back the fire for a relatively short period (up to 30 minutes effectively, in developed fire conditions), with a risk that levels of heat on the protected side become too high for people and fixtures, fabrics and fittings. Consideration of transmitted heat levels may cause both the pane size of integrity glass, the extent of glazed area and application to be limited. The level of protection may only be sufficient for the purpose of rapid evacuation of the building in short time (for example, 20 minutes), on the assumption that:
  a) The alarm is given and acted upon relatively promptly.
  b) The occupants are familiar with the building, can move readily and calmly, without support and supervision, in conditions that are not too crowded and congested.
  c) The fire and rescue service receives the emergency call in good time for rapid response, and can get promptly to the fire within a matter of only some minutes.
- The highest level of protection – the lowest risk profile – and the highest degree of confidence in effective fire protection is obtained by the use of a fire-resistant glass that provides reliable insulation performance (together with integrity). Large areas and extensive use of such a fire-resistant glass can be incorporated in the design, in a variety of applications, for the purposes of escape, access and prolonged protection against high fire intensity and hours of exposure. Insulation performance is therefore particularly of value, and used extensively, because of the need for a high level of assurance given the high risk of damage should fire break out and the element of unpredictability that essentially accompanies fire events. Insulation is therefore the most reliable choice and the one that offers maximum peace of mind, especially if the objective is to have a substantial measure of confidence against fire during the working life of the building. It is a level of performance that is essential to guard against the risk of prolonged or intense fires, and the only choice that provides a sufficient safeguard against extensive damage to the building and surrounding buildings from extensive fire development.

Pic copyright Graham Collins

Fire Safety Design with Glass

The role for fire-resistant glass is an essential one to maintain the transparent design concept. Structural resilience in resisting fire and limiting fire spread is a basic prerequisite, and in those respects fire-resistant glass is very effective as part of a fire safety compartmentation and fire separation strategy using the construction and layout of a building to contain and isolate fire.

Fire-resistant glass is also used in partitions or doors to provide protected corridors and transit points for quick and safe evacuation or access by fire and rescue personnel. That includes lobbies around escape stairs, the stairs themselves and refuges as places of relative safety en route to a place of safety outside the building. The sense of openness created by glass constructions also has an advantage: it helps to reduce panic and encourage orderly evacuation by allowing occupants to be aware of what is going on to move away from the seat of the fire.

For the designer working with glass there are three particular areas that merit particular consideration. These are: the combination of fire resistance with sound insulation; the use of integral loaded fire-resistant glass floors to maintain the transparent design core theme; and the use of fire-resistant glass in facades to prevent break out and spread via the facade.

Combining Fire and Sound Insulation

Plastic organic interlayers are commonly used in glass laminates to help achieve acoustic targets. But these have no significant practical resistance against fire and constitute a danger through ignition and vigorous flaming of the interlayer

FIRE RESISTANT GLAZING

Pic copyright Graham Collins

when exposed to fire (which readily happens since the covering glass pane cracks so easily in fire). Thermal deterioration of organic layers becomes increasingly rapid from about 150ºC onwards, with the generation of heavy smoke and fume before flaming.

Acoustic insulation can readily be combined with certain types of fire-resistant glass, e.g. those that produces fire resistance by the use of an inorganic glassy interlayer (such as Pilkington Pyrodur integrity, with additional benefit of 15 minutes insulation rating, and Pilkington Pyrostop full range of insulation or inorganic gel layers (such as the Contraflam range). It is quite possibly to effectively design with fire-resistant glass types at various levels to achieve very good sound insulation together with reliable fire resistance.

Loadbearing Fire-Resistant Glass Floors

The transparent glass design concept cannot be said to be complete without the option of fire-resistant glass floor constructions. Fully tested integrally loadbearing solutions are now available using products from major glass manufacturers, and particularly good developments have been made with a 60 minutes rated insulated and integrity structure, using either steel or timber supports.

Such options also combine robust fire protection with effective acoustic insulation. The sound insulation R_w index for the Pilkington Pyrostop glazed floor structure, for example, is 48 (-1;-5), reference EN ISO 717. This is a remarkable result – providing a tremendous combination of fire resistance, acoustic performance, loadbearing capacity, and design capability. The loadbearing capability of the floor must be demonstrated by fire testing under load. The applicable test standard in Europe is EN 1365:2000, part 2, Fire resistance tests for loadbearing elements: floors and roofs, subject to loads determined in accordance with EN 1363-1. An applicable successful test report is essential for all fire-resistant glass systems.

The make-up of the floor system has to guard against the possibility of heat transfer into the structure of the floor itself, and the glass used must be a fully established and validated insulation with integrity glass to restrict the possibility of heat transfer into the glass floor structure itself. Uninsulated integrity fire-resistant glass, on the other hand, risks structural instability under load and fire exposure because of the possibility of heat transfer into the structure.

Façade Glazing

One of the major risks concerning fire spread is the threat of fire break out from inside the building through the glazed façade either to transfer fire to facing buildings or to allow ready fire transfer up the face of the same building jumping from floor to floor (clearly a concern for tall and especially complex multi-occupancy type buildings).

Such a threat can easily be countered by incorporating sections of fire-resistant glazed systems in the façade. In most situations a high performance integrity glass in a double glazed unit would suit, in others the risks and value of the building and surrounding buildings may also justify the use of a higher performance level of fire protection, using insulation performance (for example for sections of atria adjoining lobby, escape and refuge areas).Similar considerations should also apply for atria where there is a risk of break out into the atria from the adjoing room spaces.

Such a design strategy does not need the whole façade to be constructed from fire resistant glazing. Bands of fire-resistant construction at regular intervals running up the building would be sensible, to act as a fire break according to a well tried and tested principle. Such installations should also be considered at particular hazard locations or critical safety points. Such locations, for example, would be external glazing at re-entrant corners and angles in the façade to prevent fire jumping across the gap on the same floor level, bypassing internal compartmentation. Similar considerations apply to protection for escape lobbies, vertical stairways and for glazing adjoining roofs and external escape ways.

Looking to the Future

The design job certainly does not get any easier. The trend in the built environment is towards the more complex, crowded, taller and individualistic, at the lowest possible overall cost and optimum efficiency, whilst seeking to create sustainable building value and optimum function. There is increasing pressure on space utilisation as owners look to squeeze the maximum use from their buildings. All those trends increase the threat of fire. And since glass has a major role to play in modern design, there will always be a vital and expanding role for fire-resistant glazed systems.

The stakes are high. And the overall message concerning glass and fire is a basic one: Do not take unwarranted risks, based on unjustified assumptions. IFP

Mike Wood is a technical consultant on glass and fire. He is chair of the UK's Passive Fire Protection Federation (PFPF) and a member of the Fire Sector Federation Executive

For further information, go to www.pilkington.co.uk/fire

Getting to Grips with Intrinsically Safe Fire Detection

Warren Moyle

Apollo Fire Detectors

An intrinsically safe (IS) system is defined as one that 'comprises apparatus and interconnecting wiring in which any spark or thermal effect in any part of the system intended for use in hazardous areas is incapable of causing ignition'. Applications where IS systems are required can include any locations where an explosive mixture of air and gas or vapour is – or may be – present continuously, intermittently or as a result of an accident.

These locations are defined as hazardous areas by BS EN 60079, the code of practice for installation and maintenance of electrical apparatus in potentially explosive atmospheres. These hazardous areas are most commonly found in petroleum and chemical engineering plants, off-shore oil and gas platforms and in factories that are processing and storing gases, solvents, paints and other volatile substances. Electrical equipment for these areas needs to be designed so that it cannot ignite an explosive mixture, not just in normal operation, but also in fault conditions. There are a number of methods available to ensure that the electrical equipment will not ignite under these conditions including oil immersion, pressurised apparatus, and powder filling.

However, the two most common methods are using flameproof enclosures and intrinsically safe systems. Flameproof equipment is contained within a box so strong that an internal explosion will neither damage the box nor be transmitted outside the box. The surface must remain cool enough not to ignite the explosive mixture. When flameproof equipment is interconnected, flame-proof wiring must be used. This method is most valuable when high power levels are unavoidable, but it is not acceptable for areas in which an explosive gas-air mixture may be continuously

INTRINSICALLY SAFE DETECTION

present or present for long periods. Under these conditions, the only approved method is using intrinsically safe systems.

Understanding the Legislation

Intrinsically safe (IS) technology was first introduced into fire detection equipment in the early 1980s. Over the next 20 years, demand continued to rise and the technology developed, but no industry standard or regulations governed its use. It was not until July 2003, and the introduction of the ATEX (Atmosphere Explosive) Directive, that the use of IS equipment for certain hazardous environments became mandatory.

phere occurring and its persistence if it does. Within these hazardous areas, three zones are identified:

- Zone 0 – Category 1 – where an explosive gas-air mixture is continuously present or present for long periods.
- Zone 1 – Category 2 – where an explosive gas-air mixture is likely to occur in normal operation.
- Zone 2 – Category 3 – where an explosive gas-air mixture is not likely to occur in normal operation, and if it occurs it will exist only for a short time.

Any electrical equipment located within these areas – such as sockets, lighting and computing devices – must be designed so that it cannot ignite these explosive mixtures both in normal operation and also in a fault condition.

Flameproof devices can be used in Zones 1 and 2 – areas where there is an intermittent danger or an accidental spillage. However, where there is a constant mixture of explosive gases or chemicals (Zone 0), IS equipment is the only permitted method. It operates at such low power and with such small amounts of stored energy that it is incapable of causing ignition in normal conditions, with a single fault (for ib classification) or with any combination of two faults (for ia classification). The 'small 'i' stands for Intrinsic Safety; 'a' and 'b' refer to the protection conception, meaning the system still operates with a single fault (ib) or two

Hazardous areas are most commonly found in petroleum and chemical engineering plants, offshore oil and gas platforms and in factories that are processing and storing gases, solvents, paints and other volatile substances. Electrical equipment for these areas needs to be designed so that it cannot ignite an explosive mixture, not just in normal operation, but also in fault conditions. There are a number of methods available to ensure that the electrical equipment will not ignite under these conditions.

The ATEX Directive consists of two EU directives – one for the user of the equipment and one for the manufacturer. The first is the Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres. The second is the Directive 94/9/EC (also known as 'ATEX 95' or 'the ATEX Equipment Directive') concerning equipment and protective systems intended for use in potentially explosive atmospheres.

The ATEX Directive applies to all equipment intended for use in explosive atmospheres (zoned areas), whether electrical or mechanical, including protective systems. It applies to a large range of equipment found in environments including fixed offshore platforms, petrochemical plants, mines, flour mills and other areas where a potentially explosive atmosphere may be present.

The ATEX Directive requires system owners to classify areas where hazardous explosive atmospheres may occur into zones. The classification given to a particular zone, and its size and location, depends on the likelihood of an explosive atmos-

faults (ia) on a single device. In any of these conditions, every component must remain cool enough not to ignite the gases for which it is approved. It is critical that both sources of ignition – sparks and overheating – are considered. IS ensures that even with as many at two faults on the circuit board, the equipment will not spark or overheat.


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IS Fire Detection Protects Defence Manufacturer

Apollo's intrinsically safe (IS) fire detection technology was specified to protect a new manufacturing facility at the Wallop Defence Systems' site in Hampshire in the UK. The company is a world leader in the design, development and manufacture of defence pyrotechnics for air, sea and land applications.

Among the products manufactured at Wallop Defence Systems' site are infrared flares to counter air-to-air and ground-to-air missiles, decoy systems for naval protection and missile tracking flares. The assembly of these essential defensive products involves the use of potentially flammable and explosive materials, so fire protection is a key priority to ensure safety of personnel and protect valuable assets.

Apollo's fire detection products met all key international standards, including the European ATEX Directive requirements for equipment used in areas with potentially explosive atmospheres, and Apollo's extensive in-house testing facilities were used to demonstrate to Wallop Defence Systems how the IS devices would work in practice.

The installed fire system was based around Apollo XP95 IS fire detectors and a four-loop Kentec Syncro control panel. The system features a modem link so that fire system performance can be monitored remotely 24/7. The entire system is wired using mineral-insulated (MICC) cabling. This is an additional precaution against any part of the system causing an electrical spark.

Around 100 Apollo IS devices provide comprehensive fire detection in the manufacturing areas. Where flame detection was required, devices were used in conjunction with IS-rated enclosures to meet the requirements for intrinsic safety. Due to high ambient noise levels, visual indicators are used in the administrative areas, while Vimpex IS sounders are fitted in the transfer corridors between manufacturing processes.

In the event of an alarm being raised, the entire premises are evacuated immediately. The site has its own firefighters who are trained to tackle minor incidents. In addition, a repeater panel in the main gatehouse alerts security staff to any incident, so that they can summon the appropriate external fire services as required.

An Intrinsically Safe Solution

The basic premise of IS design is that it limits stored electrical energy and surface temperature. This is achieved by limiting current and limiting voltage. Using IS technology in fire detection equipment delivers a number of benefits including:

- Least expensive – there is no requirement for lockable fused isolators, protected cable or special glands.
- Simple apparatus – it permits the use of normal industrial devices if they are non-energy storing.
- Fault tolerant – it is the only technique that stays safe after faults develop in cables and fallible components.
- Live maintenance – it is the only technique that permits live working without gas clearance certificates.
- Unarmoured cable – the system is electrically protected instead of being mechanically protected.
- Safe for personnel – it uses extra low voltages and currents.
- Safest technique – it is the only technique permitted for use in Zone 0.

Types of System

Apollo offers both addressable and non-addressable solutions for IS areas. Both methods require the use of a barrier before the hazardous area. The barrier stops any large voltage spikes, which could result in devices sparking or over-heating, entering the hazardous area. Generally, the recommended barrier type is galvanically isolated. This type of barrier enables safe wiring and installation without the added complications of earth screens being required.

For an addressable system, a further required component is the protocol translator. This device is invisible to the control panel but allows the addressable devices in the hazardous area to communicate with the control panel even with the much lower voltages and currents being used.

Furthermore, on the addressable system, the wiring is made in zonal circuits from the main loop. The system drawings for IS systems shows spurs or radials of wiring into the hazardous area, but it is not acceptable to then loop back out again.

Testing and Approval

Given the complex and volatile nature of the settings within which IS fire detection is used, testing is a critical part of the manufacturing process. Manufacturers and suppliers – or importers if the manufacturers are outside the EU – must ensure that their products meet essential health and safety requirements and undergo appropriate conformity procedures. At Apollo, our equipment is tested in our electro-magnetic capability (EMC) laboratory and fire test laboratory. We also follow a production process protocol ensuring that all IS devices are tested at every stage and signed off by an approved operator. As well as in-house testing, products used in IS settings require approval by industry authorities in the countries in which they will be used. Apollo's IS products have, for example, received approval from Lloyd's Register, the Marine and Coastguard Agency, the American Bureau of Shipping, Bureau Veritas, Det Norske Veritas and Germanischer Lloyd.

Looking to the Future

The global demand for IS fire detection equipment is set to continue to rise over the coming years, with countries such as Russia and China identified as major growth areas due to their on-going investment in petrochemical plants. In the UK, the offshore industry remains a significant user of IS equipment, and demand from power stations in mainland Europe is likely to continue to increase in the future. IFP

Warren Moyle is Senior Product Support Engineer at Apollo Fire Detectors

For further information, go to www.apollo-fire.co.uk

Simon Ince

Exova Warrington Certification

Don't wait for a tragedy

Taking stock of passive fire protection in non-domestic property is a major challenge worldwide, and there are risks of not examining this issue thoroughly and professionally throughout the supply chain.

A building, just like a body, does show signs of cosmetic ageing; paint peeling and marked, carpets worn and dirty, damage to the fixtures and fittings etc. These being the building equivalent of a bald head and wrinkles; cosmetic issues that, unlike the body, can painlessly and relatively cheaply be put back to a youthful appearance once again. However, it is not always obvious to the property owner that things under the skin of a building are not working properly.

Passive fire protection that is not functioning correctly does not scream out at the building owner; unlike with painful joints and aching muscles, there is no early warning of imminent failure when a harsh test comes along. When a fire starts within a property the demand on the built-in fire protection starts immediately. If it is not up to the test, the consequences can be disastrous.

The Power of Youth

Should we just knock all the old and decrepit buildings down that are not heritage listed and start again? Surely new builds do not have the same wear and tear as older building stock, so problems with fire protection should not be an issue.

Inherently, new builds must be safer than some of the existing stock. On paper that holds true, we know that new buildings are not often designed without any regard for fire safety; certainly they should not gain building approval if there is any cause for concern. Active and passive fire safety is planned by the architect and checked by building control, so there cannot be any issues with modern designed buildings.

If only what was on the drawings made it in to the building every time; they would indeed be fire safe. However, it is a long, long way from a set of plans to full building occupancy and all the stages in between those starting and finishing points are fraught with opportunity for error. Building control would not sign off a building with poor fire protection, would they? Unfortunately some have, and some will continue to do so.

Built in 2006, Priory Hall, a housing complex in Dublin, Ireland, was home to 256 residents. In 2011 after a string of snagging problems, all the occupiers of flats in Priory Hall were forced to leave their homes when the building was declared a fire hazard. Due to the amount of non-fire-related problems experienced by residents,

an invasive investigation was undertaken by the local authorities; revealing a lack of fire-stopping in the external cavities of the building.

Any fire breaking in to these cavities could have spread rapidly through the entire complex. Priory Hall may only be the tip of an 'Irish building boom' iceberg. During the 'Celtic Tiger' years, some buildings were quite literally thrown up as quickly as possible, which should really have set some alarm bells ringing with the Irish authorities. This speed of construction, combined with a building control system that allowed property developers to 'self certify' that their new builds complied with the plans approved by building control, may yet give rise to many more unsafe buildings being discovered in the future.

It could be said that the recent introduction of new much tighter building control measures in Ireland is akin to locking the stable door after the horse has bolted; with the Irish construction industry being in its fifth consecutive year of significant decline.

Tragic Consequences

With a long and well established building control system in place in the UK surely a Priory Hall could not happen here? Pacific Wharf, a luxury development on the banks of the River Thames, is strikingly similar to the example in Ireland.

Residents had damp and mould issues from the first few days of occupancy. However, what is more concerning is that NHBC – the UK's leading provider of new home warranties – signed off the building as a quality construction, certifying its build quality under its home assurance scheme. Thankfully, once again the issues of poor fire-stopping were caught early before any fire, and following extensive and prolonged remedial works the building was made safe and is now reoccupied.

With competition between approved building inspectors and local authority building control the extent and depth of site inspection has inevitably been squeezed. It is not a question of a building control officer not picking up fire protection issues if they see them. The issue comes with the hidden or hard to see built-in fire protection that is installed when they are not on site.

Building control cannot pick up all the fire protection issues that could be present in a new build and any defects built in may never come to light, unless there are other build issues such as those in Priory Hall and Pacific Wharf, which lead to a discovery or where a real fire in the building tests the effectiveness of protection.

Fortunately, fires in the UK are decreasing year on year and fatal fires are on the decline as a result. However, fires do occur, passive fire protection does fail and people do die. When a multiple fatality does occur, there are normally multiple contributory factors. Two such fires in the UK illustrate why functioning passive fire protection is so vital when a fire starts in a building.

The well documented fatal fires in Rose Park Care Home and Lakanal House residential block of flats had common elements that contributed to the deaths of those who were sadly trapped in the buildings. One of those common factors was that elements of passive fire protection did not work properly. Thus the spread of flames and smoke were not contained and tragically multiple lives were lost.

What is the Scale of the Problem?

New and old properties alike have passive fire protection issues but it is very difficult to put a figure on just how much of a problem this is. A research project carried out in New Zealand by the Fire Protection Association in 2008, indicated that fire protection issues were spread across a wide variety of buildings. In a pilot-scale study of buildings that represented the spectrum of New Zealand building stock; the survey findings indicated that there were a number of 'significant and serious' problems regarding the passive fire protection across the range of buildings surveyed.

The report went on to highlight many issues that we at Warrington Certification recognise through our own work as an independent inspection body. Penetrations through compartment walls not fire stopped, minor and major issues with physical installations of fire protection, a lack of maintenance, and above all a general lack of

understanding from installers and building owners of how seemingly minor gaps and holes can lead to failure of complete passive fire safety systems.

UK fire safety legislation is risk-based and focuses on life safety; it requires the person with control over a building to complete a life safety fire risk assessment; an assessment that should include an evaluation of the passive fire protection.

Over the past few years, as part of our Fire Risk Assessors Certification Scheme (FRACS), we have reviewed hundreds of fire risk assessments from applicants' nationwide. These assessments cover many different types of buildings, from new build to heritage buildings, small shops to large hospitals and almost without exception, passive fire protection deficiencies are identified within the significant findings of these reports.

Minor issues in low risk buildings are very common but also prevalent are major risks in high risk buildings. Hospitals, care homes, hotels and apartment blocks, all with potentially life threatening problems with the passive fire protection.

Fire is Hot but Fire Protection is not

Passive fire protection is a bit like car insurance, you only need it when you have an accident or if you get stopped by the police. For building owners and managers, it is so very easy for fire safety to drop off the radar, especially when other more pressing things are demanding attention and money.

A recent applicant for the FRACS (Fire Risk Assessors Certification Scheme) told me that he had just dropped one of his care home clients; the reason being was that for three years he had been visiting the home and for three years running he found the same issues with fire protection. The owner seemingly unwilling or possibly unable to make good the remedial improvements required.

UK, it is widely anticipated that new guidance/new codes of practice will be introduced by the UK government. It is also safe to say that any new initiative to prevent such tragedy occurring again will be fully supported by the fire industry.

Risk ignorance is also a major concern, many people who own or operate high risk buildings are just not aware of the risk within their buildings. The fire risk assessment they should have completed by law, may not have identified issues with the fire protection; lack of competence of the assessor who did the inspection could be a reason why it has not been noticed. The problem could be so well hidden that a non invasive fire risk assessment survey by a competent fire risk assessor would not have seen the issue. Generally speaking though, when a competent fire risk assessor completes a fire risk assessment, he or she should pick up on the overall standard of fire protection within a building.

If the standard is poor within a high risk building that relies on fire protection to allow its occupants time to escape; the assessor should be making recommendations for further investigations by competent persons, or if the problem is isolated and easily visible they should be suggesting the actions required to rectify the issue.

Nervous and for Good Reason

Within the current UK economy many businesses are tightening their belts and spending on fire safety is not a priority. However, when there is anticipated action from government following a fatal fire enquiry, quite rightly people start to get their own house in order. Certain sectors of property owners in the UK are already busy trying to get to grips with their building stock, busy trying to find out what their passive fire protection is really like.

It is a long, long way from a set of plans to full building occupancy and all the stages in between those starting and finishing points are fraught with opportunity for error. Building control would not sign off a building with poor fire protection, would they? Unfortunately some have, and some will continue to do so.

This owner, like many others who have been made aware of real issues, is apparently willing to accept the risk. It would not be a bold statement to say that the families of his elderly residents might not see his acceptance of risk as being okay.

Risk acceptance for others is one issue that tragically was recently brought to the world's attention, when 241 people died in a nightclub fire in Brazil. Four people have been charged with manslaughter following initial police enquiries.

There is no doubt that all around the world tragedy drives legislation, guidance and standards. Following the senseless loss of young life in the nightclub fire in Brazil, local and national legislation is being put in place to prevent this scale of loss ever happening again. Combined with this legislation is a huge education campaign to make sure all those with responsibility for fire safety in Brazil understand what is required.

Following on from the findings of the recent inquest in to the Lakanal House fire here in the

The key criterion is get good competent advice on fire risk, on fire legislation and on remedial works, and that advice needs to be holistic. Recently we became involved with a client who had only taken competent advice on remedial works and was about to spend £350,000-plus on fire safety work that just was not needed to comply with fire safety legislation. They had failed to look at the bigger picture.

It should Not be Broken so Fix it Now

Fire protection should be a given, not a nice to have. It is something that should not be purposely ignored; genuine ignorance is no excuse either. Building owners need to find out now what they have or have not got in terms of passive fire protection and on a risk basis make the improvements that are required.

Why wait for another tragedy when many tragedies are preventable under current fire safety standards? IFP

Simon Ince is Manager Personnel Certification Schemes at Exova Warrington Certification

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Heritage Fire Supp

Stewart Kidd

British Automatic Fire Sprinkler Association

Fire is arguably the greatest threat facing those responsible for safeguarding heritage buildings. While risks such as theft, flood and even insect or fungal infestation can damage buildings and their contents only fire can completely destroy them. Each year, throughout the world, there are fires in every type of historic and heritage buildings. A number of these outbreaks reach serious proportions where measurable fire loss can soar into the millions. The loss of important artefacts, cultural resources and national heritage mean such fires are among the most feared.

While it is difficult to determine the exact extent of the loss, there is broad agreement that in the UK, for example, a building of major national importance is lost or seriously damaged by fire each week. The latest published data from Historic Scotland (2008 to 2009) suggests that there are probably more than 600 fires in listed buildings each year in Scotland alone.

All heritage organisations agree that the best way to guarantee the future of a building is to keep it in use for its original purpose. Only where this is not possible should a change of use be considered, although it is clear that significant strides have been made in finding appropriate alternative uses for many historic buildings.

Dwellings have been created from structures as diverse as places of worship, mental hospitals and barracks; old spinning mills have provided units for small businesses and shops have been created out of flour mills and warehouses. The conversion of an Edinburgh orphanage into the Dean Gallery of Modern Art is an excellent example of this practice. Another is a hotel chain that has successfully provided new uses for a seamen's mission, a municipal tramway company offices and even a prison.

Following the 1992 fire at the 11th century Windsor Castle in the UK, the Bailey Report concluded that automatic fire suppression systems could play a useful role in the protection of heritage buildings, particularly where it was difficult to introduce other fire protection measures such as improved compartmentation. In fact, just as in new buildings, where the introduction of sprinklers can greatly assist the architect in bringing to life exciting new concepts in building design, sprinklers can make it possible for a historic building to meet current fire safety standards with minimal impact on the heritage fabric and values.

In the UK, much of the pioneering work in this field has taken place in Scotland and Historic Scotland has played a leading role in the wider promotion of the sensible use of fire suppression systems. There are now many different examples of important buildings now fitted with fire suppression systems.

Triggers for Consideration

In Chapter 5 of Historic Scotland's Guide for Practitioners No 7: *Fire Safety Management in Traditional Buildings*, this Approved Code of Practice sets out the criteria that must be followed when adaptive reconstruction of historic buildings takes place. In particular, the text reviews the

HERITAGE BUILDING FIRE SUPPRESSION

ression

difficulties that may follow in providing adequate means of escape in case of fire; taking the example of the conversion of a 19th century office building into an hotel and considering the difficulty of fully complying with building regulations and asks: "How then can one approach the problem described above in relation to making changes to the listed building to permit its use as the hotel without wide scale destruction of the authenticity of the features which make it worth listing?"

Fires in Scottish Heritage Buildings 2008/9

Service	A Listed	B Listed	C Listed	Total
Central	4	12	1	17
Dumfries & Galloway	2	8	2	12
Fife	2	8	9	19
Grampian	5	43	12	60
Highlands & Islands	2	11	6	19
Lothian & Borders	30	130	71	249
Strathclyde		*No Data Available*		
Tayside	8	23	11	42
Totals	62	244	112	428

Source: Scottish Historic Buildings National Fire Database 2010

Note that the totals could be increased by perhaps 20 percent to account for no data being provided by Scotland's largest region. Extrapolating such data for the UK might suggest that there may be at least 200 to 250 fires each year in Grade 1/A buildings

One of the suggested remedies is the use of a fire suppression system and the Guide adds that: "Considerable benefits can accrue from the introduction of well-designed automatic fire suppression systems even where these are not specifically required under Scottish Building Standards." Part 2 of the Guide goes into considerable detail on the use of fire suppression systems and makes it clear that this may be the only way of achieving a change of use commensurate with the appropriate levels of compliance with building regulations:

The value of automatic fire suppression systems has also been recognized in building regulations and in guidance produced to accompany current UK fire regulations.

Benefits of Heritage Fire Suppression

Where once the idea of installing automatic fire suppression systems into mansions, castles, churches, museums and libraries may have seemed absurd it is now clear that a sprinkler system can save nationally and internationally important structures and their contents. Sprinklers have also been used as a compensating feature in developments where building regulations cannot be complied with in respect to means of escape or access for the fire brigade. Some projects have even reported that providing sprinklers has resulted in a cost saving where the building authority has permitted trade-offs in respect to means of escape facilities, structural fire protection measures and surface-spread-of-flame requirements.

More specifically, an automatic fire suppression system can provide compensation for:

- Poor or restricted access – particularly in winter.
- A lack of firefighting water or public hydrant system.
- Limited means of escape.
- Premises where public fire cover is limited and where reinforcement may take hours rather than minutes.
- Premises that are left unoccupied for long periods.
- Premises where the contents may be of exceptional value or cultural importance.
- Where surface-spread-of-flame standards cannot be complied with.
- Premises where there are unsatisfactory structural features, such as roof spaces lacking compartmentation.

Standards for Installation

Sprinklers can be installed using any one of a number of accepted standards. In the UK, for non-residential buildings this is BE EN 12845 (2009). BS 9251: 2005 may be used for smaller residential and domestic buildings. Watermist systems should be designed and installed to BS DD 8458 (2011) for residential properties and BS DD 8489 (2011) for other properties.

Types of Systems

While there are a range of different types of sprinkler systems used in a variety of premises, it is considered that only wet systems should be specified in heritage buildings. These systems are the simplest, easiest to maintain and are also the most cost effective. Pipework can be copper, steel, stainless steel or in CPVC (chlorinated polyvinyl chloride) that is approved for the purpose. Further information on sprinkler systems is available in BAFSA Publication BIF 15 *(Types of Sprinkler Systems)*. Additional information on watermist systems is in BAFSA Publication BIF 9 *(Water Mist)*.

System Design and Installation

The high reliability and effectiveness of these systems has come about over the years by strict adherence to design standards. It would be wise to select a contractor who is not only capable and competent but who also has an established track record and who can offer proof of compliance with an established quality assurance system.

Full information on the various third-party certification schemes is available in BAFSA Publication BIF 20 *(Third Party Certification)* at www.bafsa.org.uk IFP

Stewart Kidd is Secretary General of the British Automatic Fire Sprinkler Association

For further information, go to www.bafsa.org.uk

15 years of the IW

Bettina McDowell

International Water Mist Association

The beginning of the IWMA – the International Water Mist Association – was what might be called rather provisional and informal. In the early days of the Association there was neither a proper office nor any employees – let alone any major activities. However, there was a target.

Looking back, Dirk Sprakel, chief executive officer of Cologne-based Fogtec and current deputy chairman of the IWMA board, today puts it like this: "Against the background of the then developments, which had some of their roots in Eastern Germany, the founding members of the IWMA wanted to aim at bundling what was happening on an international level and communicating matters of common interest." These intentions eventually led to the founding of the IWMA, which took place just over 15 years ago in April 1998.

The two following years were a phase of initiation during which the few members – most of them German – merely worked together on joint research projects and established the first working group, the aim of which was to collect existing guidelines for standardisation worldwide. Dirk Sprakel says: "The first two years were a time of casual exchange of thoughts and ideas, but as time went on our plans became more palpable."

Then, in 2000, things really started moving. The IWMA became much more international and in April of the following year the first International Water Mist Conference was organised in cooperation with Factory Mutual Research from the USA, the Norwegian fire research laboratory SINTEF, the Swedish testing and research Institute SP, and the Finish institute VTT. Karl Sprakel, the first chairman of the board and, today, still honorary member of the IWMA, welcomed more than 70 delegates from 20 countries to Vienna to exchange views and information on fire protection with water mist.

The purpose of this conference was to introduce the IWMA and to put it on the firefighting world stage. The aim was also to assert that water mist is not only an auxiliary technology, but a very significant method of extinguishing fires; one that is completely independent from traditional sprinkler systems.

Back then, water mist – and consequently the IWMA – was met with scepticism and open opposition. Dirk Sprakel remarks: "In those days we may not have been very professional about running an association, but we were extremely enthusiastic." He adds: "At the beginning some of the water mist manufacturers were ridiculed mainly because they came from water hydraulics or other industries and were more or less new to the firefighting industry."

MA

Much has changed since then, mainly due to the natural learning processes, some important turning points and even to the odd moment of glory. The enthusiasm lingers on, though.

Turning Points and Moments of Glory

The first giant leap was the invention of the technology itself through F.E. Myers. The US company had developed a back-pack system that produced small water droplets in 1880. After that many years passed without that much happening. However, the banning of Halon in the late 1980s via the Montreal Protocol and a devastating fire that broke out on the passenger ferry "Scandinavian Star" in 1990 killing 158 people initiated major changes.

Both events called for alternative firefighting methods and triggered the rediscovery and advancement of water mist as a fire extinguishing agent. Consequently companies were launched or expanded their production. Among the first were the Swedish company, UltraFog, which was newly founded, and Marioff from Finland, which had a water hydraulics background and turned to water mist in 1991 as a new business opportunity.

The initial developments within Sweden, Finland but also Denmark – through Semco and Novenco – had their effects on the firefighting market and, in the late 1990s, it was high time to establish an association that supported research and development as well as applications, brought together those who were active in that business and tackled one major problem – the establishment of international guidelines for the approval of water mist systems.

"Since then the IWMA has become the world leading forum for manufacturers, laboratories, classification institutions, academic institutions and users of water mist firefighting systems", says Ragnar Wighus, chief scientist at SINTEF and chairman of the IWMA board.

In order to reach that position there was work to be done and opportunities to be seized. In that respect a research project sponsored and organised by the IWMA on "scaling of fire suppression characteristics in machinery spaces" carried out by SINTEF on behalf of the International Maritime Organization (IMO) was one of the major milestones. The presentation of the project's findings at the IMO in London in February 2009 was a key event for the Association. Another important milestone for the IWMA was the opportunity to support the European Committee for Standardisation, and contribute to the CEN-guidelines.

Apart from that, the US National Fire Protection Association (NFPA) has relied on the expertise of the IWMA on several occasions and has asked the Association to organise seminars on fire protection with water mist to be held during the annual NFPA Conference and Expo. Most important though may be the fact that most of the opposition has petered out and scepticism along with it. "Some of our opponents in the initial phase – even the very severe ones – are indeed heavily involved in the water mist industry themselves these days. And most of them are nowadays members of the IWMA", says Dirk Sprakel.

Annual Conferences and Seminars Worldwide

Since 2001, the IWMA conference has been held annually in a number of major European cities including Amsterdam, Rome, Budapest and Copenhagen. The conference in 2009, which was held in London, saw the introduction of the water mist anthem – words by Ragnar Wighus – which the members sing when they gather for the annual members' meeting and which the delegates from outside the IWMA have had the chance to listen to at the opening of every conference since then. And they will have the opportunity to listen to the anthem again on 16th October this year, which is the first day of the 13th IWMC to be held in Paris.

The conference is a two-day event and to make sure that all presentations reach a certain level of information the scientific council – which has been a body within the IWMA from the start – views all proposed lectures.

The speakers are experts on firefighting; they come from within the water mist industry and the IWMA, but also from other disciplines such as architecture and construction engineering, and from universities, colleges and institutes. Topics are fire protection with water mist in trains, tunnels, maritime vessels, data centres and hotels. Other topics include research, testing and applications.

Picture courtesy of Fogtec

The IWMA seminars are rather more educational and challenge the participants as far as knowledge is concerned at a completely different level than the conferences. They provide the listeners with a general overview about water mist technology and the typical attendee is somebody who would like to learn more about the physics behind and the characterisation of water mist.

So far the IWMA has held its seminars in Orlando, Dallas and Mobile in the USA, various countries throughout Europe such as Italy, Britain, France, Denmark, The Netherlands and Germany and on two occasions in Dubai in the United Arab Emirates.

Future Prospects

As far as future plans are concerned there is a strategic as well as an operational focus.

On the strategic front is the wish to extend cooperation with other national and international associations. Additionally, the IWMA would like to strengthen and advance research and development. "In fact the Scientific Council of the IWMA is currently preparing a new project, which will be launched during the course of this year", says Dirk Sprakel. There are also plans to set up more local events. So far there have been two seminars this year, one in Dubai and another in Paris, France. There will be two more seminars in 2013; one in Denmark and one in Italy. On top of that the IWMA has booked a booth for this year's NFPA Expo in Chicago, USA.

Together with this comes the wish to make the IWMA even more international and expand the Association into Asia and the Middle East. The first steps have already been taken.

For 2014, there are plans to hold seminars in Germany, Poland, Britain and possibly in China or again in Dubai. As far as the operational focus is concerned, the newly established marketing group has taken over responsibility. Within that group there will be talks about the possibility of social networking and a re-launch of the IWMA's homepage; so a complete new look as well as new areas and a wider choice of opportunities for members as well as non-members may be the outcome of that working process.

In addition there are still some very basic tasks to tackle. As the IWMA chairman puts it: "One of the most pronounced misconceptions was, and still is, that water mist tested for the marine sector (according to IMO standards) cannot be used in land-based applications. The second is that water mist can replace all other firefighting systems and is some sort of "magic" system."

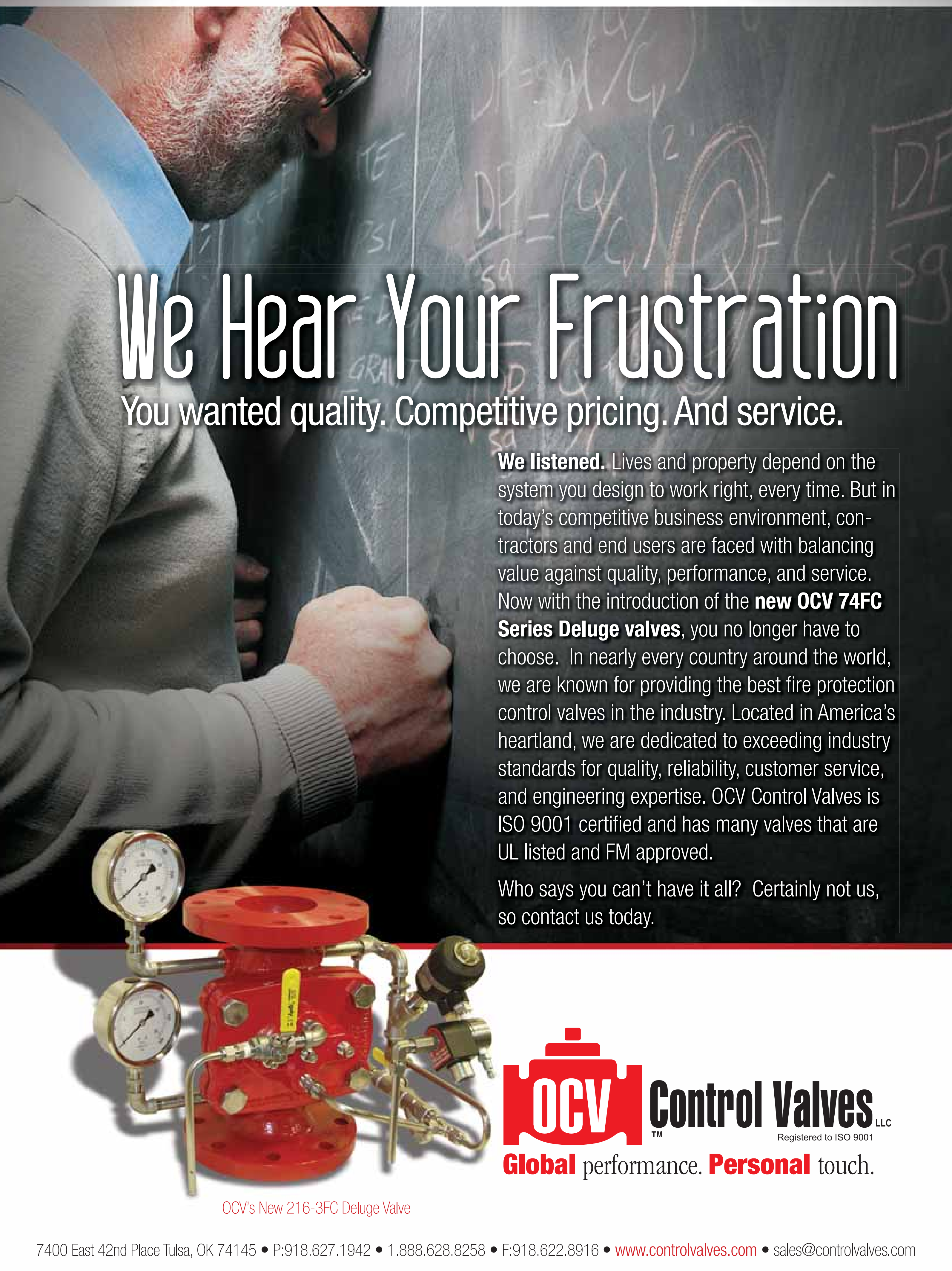
The approach that IWMA and the member manufacturers have chosen, to base all applications on real scale fire testing of the different systems, has been successful when it comes to convincing the authorities having jurisdiction that the systems can be trusted and are safe. However, the battle is not over in all parts of the world or with all applications. There are still myths about what water mist can and cannot do.

And there are challenges. One of which is to get acceptance for a European standard for water mist systems and to enter the market for industrial fire protection. Another challenge is to meet the requirements of insurance companies for inspection and maintenance systems.

So again there is work to do and chances to be seized. IFP

Bettina McDowell is Association Secretary at the International Water Mist Association

For further information, go to www.iwma.net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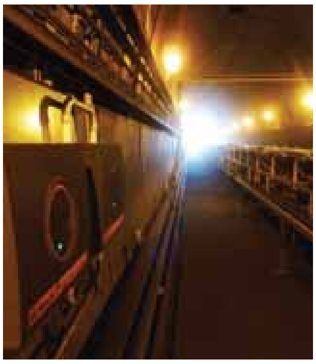
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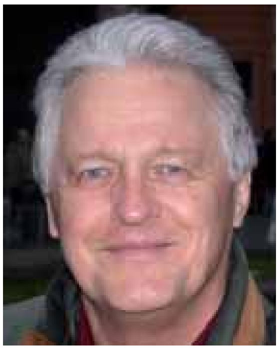

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Trains and Boats and Planes

For most of us, our fire safety attention is devoted to fires in buildings; shopping malls, stadiums, tunnels, hotels, offices and the like. Invariably, it is only when a fire occurs in a train, boat or plane that our attention switches to non-structural fires. Hardly surprising then that three recent incidents have got us once again pondering fire prevention, fire protection, suppression and evacuation in the air, at sea and in land-based mass transit emergencies.

Recently, a runaway train carrying oil derailed in the town of Lac-Megantic in Quebec, Canada and exploded, killing 47 people and making headlines around the world. Apparently, an engineer had parked the train for the night uphill from the small town. The driverless train, which consisted of five locomotives and 72 tanker cars full of crude oil, accelerated into the centre of the lakeside town where it derailed.

The train crashed into the town and swathes of the town centre were wiped out in the huge blast and subsequent inferno. At the centre of the destruction was a popular bar that was busy at the time of the explosion. 2,000 town residents were forced to flee their homes and 30 buildings were incinerated.

This disaster was the fourth freight train accident in Canada involving crude oil shipments since the beginning of the year that are currently under investigation. Following this latest incident, the Canadian government issued an emergency directive toughening rail regulations. With immediate effect, any train carrying dangerous goods must have at least two operators and must not be left unattended on a main track.

A few months earlier, a fire broke out on board Royal Caribbean's *Grandeur of the Seas* cruise ship while en route to the Bahamas, severely damaging the rear of the ship. In this instance the fire, which broke out on the mooring area of deck three, spread quickly to the fourth deck at the crew lounge area. Fortunately, it was quickly extinguished and no injuries were reported. All of the 2224 passengers and 796 crew were safe and accounted for.

Another cruise ship operator, Carnival Corporation, also had trouble with fire on board a ship earlier this year. The *Carnival Triumph* was disabled during a cruise by an engine room fire in the Gulf of Mexico, necessitating the ship to be towed to safety in the USA.

An Asiana Airlines Boeing 777 flight from Seoul crashed when landing at San Francisco's airport in the USA, killing three passengers, injuring more than 180 – 49 of them seriously – and forcing passengers and crew to make a swift exit from the heavily damaged aircraft before it was finally engulfed in smoke and flames. There were 307 on board, including 16 crew; 123 escaped without injury. From the harrowing scenes shown on television, it looks little short of a miracle that the death toll did not run into scores.

What these thee fires demonstrate is that fire safety is not just about fire alarm and detection or suppression systems; it is not even just about evacuation equipment and procedures. No, and perhaps more so when it comes to fire safety involving trains, boats and planes, it is about taking an holistic approach to achieving fire safety and recognising that human error can have a devastating impact..

No amount of fire safety equipment would have saved those killed in the Canadian train crash. However, giving more thought to the fire risks associated with transporting huge quantities of highly flammable fuel might well have made a difference. Similar comments could be made about the Asiana Airlines plane crash. It has now been reported that, although an experienced pilot, the captain of the plane was undergoing his first major training on a Boeing 777.

The lesson, for me at least, is that fire safety is not achieved if fire detection and suppression are treated as some sort of sticky tape to cover over the inadequacies of poor design, inadequate operating procedures, lack of forethought or insufficient training. IFP

Fire Protected Enclosures

HAWKE INTERNATIONAL has added a fire protection option to its enclosure range. The company's S-Series stainless steel enclosure, for cable termination in demanding environments, is now available with a K-Mass fire protective coating. The new SK Series enclosures provide safety with up to 30 minutes fire protection at 1093°C.

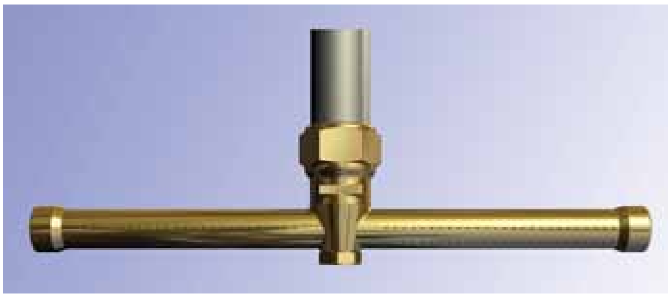
The new enclosures are designed to protect critical systems during the early stages of fire as well as giving reliable every day environmental protection for electrical equipment in zones 1, 2, 21 and 22 hazardous environments. Applications will be in offshore and onshore oil and gas installations, chemical facilities and process plants. In addition to fire protection, the enclosures are suitable for any environment where

there are potentially explosive gasses and dusts.

The K-Mass insulation is a two-part polyamide cured epoxy that is moulded onto the stainless steel case. Insulation is only activated if there is a fire. The outer layer expands and chars to minimise heat transmission, keeping the internal temperature within the enclosure below 60°C (based on a 1093°C hydrocarbon fire). The K-Mass coating is resistant to sun, rain and salt spray, physically aggressive environments and chemicals including hydrocarbons, bases and acids. The enclosures are IP66 rated for ingress protection and DTS01 rated for deluge protection.

For more information, go to www.ehawke.com

New Extinguishing Technology



Following extensive research that determined that high noise levels of a particular frequency, arising from an extinguishing system discharge, could seriously impact hard disk drives SIEMENS BUILDING TECHNOLOGIES has launched a new nozzle design that emits significantly lower noise levels when activated. The Sinorix silent discharge nozzle produces one hundredth the sound pressure when compared with the market norm addressing, the company says, the concerns of inert gas systems causing damage to hard disk drives.

The new nozzle can be integrated into an existing fire safety system, allowing businesses to update their protection without having to undertake a complete replacement.

For more information, go to www.siemens.co.uk/buildingtechnologies

Conveyor Detection

PATOL has supplied an automatic detector from its Series 5000 air purged range to protect the main conveyer belt at one of the world's largest thermal coal producers. Specifically developed to provide early warning of fire in conveyors and transport systems, it is being installed on a coal belt conveyor for Carbones del Cerrej at its integrated mining and transport complex in La Guajira in northern Colombia.

The system features a 5010 dark emission infrared sensor to detect heat signatures of moving heat or any fire conditions in the coal travelling along the conveyor. Linear heat detection cable (LHDC) is also being provided to detect static fires. The LHDC is being installed above the conveyor on a catenary wire and also on either side of the conveyor. Three controllers will provide the means to identify the source of any heat to within a metre.

For more information, go to www.patol.co.uk

Fire Engineering Conference

This year's EUROFIRE CONFERENCE will take place in Basle on the borders of France and Germany on the 9th and 10th October. It will focus on a wide range of topics from education certification, harnessing new technologies and facilitating architectural trends while continuing to maintain focus on applications and cases studies.

The two-day programme will comprise up of 26 papers. Presenter from as far afield as the USA and Australia will share their experiences, which can be used as a base for education and certification of fire safety engineers in Europe.

For more information, go to www.eurofireconference.com

Introducing EN12845 FIRE PUMP LINE

Patterson Pump Ireland Ltd. specialises in the production of world class fire protection equipment around Europe.

From enquiry stage, right through design, manufacturing, installation and after sales service, Patterson Pump Ireland strives to provide a quality, reliable fire protection system, at the most competitive price.

EN12845 provides a pan-European standard for the design, installation and maintenance of automatic sprinkler systems, and encompasses the basic requirements set forth by local rules into one European Standard.

The new Patterson Pump End Suction product line is the latest addition to the Patterson Sentinel™ range. Cost effective and efficient, these will be used in fire pump packages specifically designed and built to comply with the regulations of European standard EN12845, along with other local rules.

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New Marine & Offshore Analogue Addressable Control Panel

HOCHIKI EUROPE has launched a new HFP marine and offshore analogue addressable control panel; the first time the company has offered a control panel designed specifically for this type of environment.

The new control panel features 16 zonal LED indicators and is available in variants with either one or two detection loops. It can support up to 127 devices for Hochiki's Enhanced Systems Protocol (ESP) for each loop driver. It also supports loop-powered sounders, call points and I/O modules, and any number of the company's other marine-approved detection devices can be allocated to each zone.

The panel is suitable for all small-to-medium sized environments and can be expanded and networked to become part of much larger systems if necessary. It features a large graphical display and ergonomic button and indicator layout, is EN 54-2 and EN 54-4 compliant, and has Lloyds Register, Germanischer Lloyd, Det Norske Veritas, Korean Register, American Bureau of Shipping, Nippon Kaiji Kyokai and China Classification type approvals for a wide range of marine fire alarm system applications.

For more information, go to www.hochikieurope.com

Wireless Detection Offering

UTC has unveiled a new line of wireless fire detection products for its Ziton ZP2 and ZP3 panels.

The new devices operate in the European-approved 868MHz frequency band and complement the company's existing ZP7 addressable devices. They allow complete hybrid systems to be used in any Ziton installation.

The new wireless detectors have no external aerials and are fully addressable and programmable to suit the protected area. They are claimed to provide a robust wireless solution, with two-way, multi-path 868MHz technology and automatic selection from 32 radio channels for reliable signalling. Diversity transceivers allow a maximum operational range of more than 150 metres and, with dual battery supply the devices operate with five years' battery life under normal conditions.

Device status monitoring covers power sources, device removal and tamper, while both smoke and heat detection are supported from a single detector, minimising the SKU count for support. The notification devices feature high output with 32 selectable tones and acoustic self-test support. Wireless supervised inputs and potential free relay outputs are supported.

For more information, go to www.utcfssecurityproducts.co.uk

New Conventional Detectors

C-TEC has launched its own range of conventional smoke and heat detectors.Branded ActiV, the detectors have been third-party certified to the relevant parts of EN54 parts 5, 7 and pr29 by leading notified approval body, Intertek.

The new detectors are being promoted as being easy-to-fit, with a 9-33Vdc operating voltage, and offer outstanding detection performance. Suitable for use not only with C-TEC's CFP, FP, MFP and EP203 conventional fire panels but with many other manufacturers' control panels, the range also carries the pan-European CertAlarm System 5 mark.

For more information, go to www.c-tec.co.uk

New Global Brand for Advanced

Advanced Electronics has recently launched a global brand that will unify its international operations and which reflects the market-leading values and product advantages that have quietly made it a global success story.

Now known simply as Advanced, "because that is what everyone calls us, how we have set-up our business and what our customers think"; it is one of the world's leading fire systems businesses.

Advanced's management are seasoned fire professionals who set out to 'do intelligent fire systems more intelligently' and build on their previous experience gained in senior roles within the industry. "You do not often get the chance to put a team together with the industry experience of ours and build a business, adding new product and organisational strengths during the process, but that is exactly what we did with Advanced," says managing director, Ray Hope. "We started out by developing addressable emergency lighting systems to test ideas and technology and when we had it right, launched back into fire with the analogue addressable, Mx-4000.

"Its real success was the fact we made it easy to install and configure with a technology platform that was high performance and reliable. It is not the cheapest panel on the market, but we figured serious installers would be willing to pay a little more for reliability and reputation and save that money many times over in quicker, more profitable installation and maintenance. And we were right. It became an industry benchmark, particularly in large networks with complicated cause and effect.

"We invest time and money in providing 'easy', 'performance' and 'support'. As a result we have systems ranging in size and complexity from a simple single-loop panel to fully networked 200-node installations, in some of the most prestigious and challenging locations around the world."

Advanced's policy of continuous development means the Mx-4000, now known as the MxPro 4, is still going strong and is now joined by the MxPro 5, the business' most advanced panel. They form MxPro, the leading multi-protocol choice, offering a choice of two panels, four leading protocols, and a completely open installer network.

Ray Hope continues: "As standard, the MxPro 5 offers more engineering aids than any of our previous systems, including a revolutionary on-board oscilloscope. Its unique features make installation, commissioning and maintenance easier and more cost effective, and initial outlay is offset by more indication, performance and configuration options out of the box, plus the technology will retain its performance advantage for many years to come."

Advanced's Axis EN (EN54) and Axis AX (UL 864) systems enjoy the same technology, performance and installation advantages as MxPro, but come complete with an extensive range of devices and peripherals to suit almost any installation. MxPro 5 and Axis EN offer sophisticated false alarm management and are fully approved to EN54 Part 13. In the suppression market, Advanced's ExGo extinguishing control system protects strategic and cultural assets all over the world. Alongside this, its LifeLine radio paging system is used for detailed fire and secure staff paging, and to satisfy fire alarm requirements for the hearing impaired.

And what about the system that started Advanced's journey? Ray Hope again: "We are an intelligent fire business but our LiTe system continues to sell. That technology we spent time getting right 14 years ago is still winning customers and is testament to the strength of our approach. It proves that an Advanced system is a safe, long-term investment." IFP

For more information, go to www.advancedco.com

Paris to Host IWMA Conference

Over 130 years have passed since the USA company, F E Myers, manufactured the first firefighting system using small water droplets. About 25 years have passed since the execution of the Montreal protocol prepared the ground for water mist as a firefighting agent. And 15 years ago the International Water Mist Association (IWMA) was founded.

Now, in its 15th year, the Association will hold its 13th annual conference in Paris, France, on 16th and 17th October at the Mercure Paris Porte de Versailles Expo Hotel. The French capital was chosen – as member of the board Luciano Nigro (Marioff Italy) put it recently – because "France is currently more important for the development of the water mist market than other country within Europe."

The day prior to the conference the members of the IWMA will convene and hold their annual meeting. One item on the agenda will be the elections of the board. However, as five members of the board, including the long standing chairman Ragnar Wighus (Sintef), were confirmed in their positions only last year, only Jonathan Carter (FM Approvals) will have to face the poll.

Another item will be strategies and plans for 2014 and beyond. In fact the board and the scientific council, chaired by Bert Yu (FM Global), is currently talking about last details of a research project that will be carried out in the near future. Apart from that, the IWMA is planning to conduct a survey on the water mist industry in 2014. And there will again be many seminars in 2014.

On 16th October the conference will start – as every year – with the water mist hymn as well as an opening address and an evaluation on the current state of the water mist industry by the chairman of the IWMA.

The call for papers was released some weeks back and the first abstracts from members as well as non-members of the Association are starting to come in. Topics are usually divided into research & testing, standards & codes as well as applications. So far several speakers have handed in presentations on simulations of engine room fires, cost optimisation for commercial applications, innovative extinguishers for fire protection, and fire safety of Cologne main station. So the conference will again cover a wide range of topics and will be as informative as ever.

Last year's conference in Barcelona was very successful indeed with over 100 delegates from more than 20 countries and 22 high-quality lectures. This year the IWMA expects at least the same number of delegates, if not more. Because with its activities in the first half of 2013 – seminars in Dubai, France and Denmark as well as the booth at the NFPA event in Chicago – the IWMA managed to attract many experts from within the firefighting industry. Some of whom have become members and as some of those come from the Middle East region and Australia, there is a certain chance that the event will be even more international than it was in recent years.

Pic courtesy Istockphoto

At the end of Day One there will be a reception to discuss, network and exchange views and to visit the exhibition. This will be devised by the sponsors to show their innovations and their established products.

The conference will be held in English. However, a French translation will be provided. This event will be the most important networking opportunity for the water mist industry in 2013. It will once again show that water mist is a fully-fledged alternative to the traditional sprinkler systems. To register visit the IWMA's homepage. IFP

International Water Mist Association

For more information, go to www.iwma.net

Valve Enhancement

RELIABLE FIRE SPRINKLER (UK) has introduced a new Euro Trim Model E2 in stainless steel (E2SS) that is specifically designed for use with the company's model E and E3 wet alarm valves. This new trim has a rated working pressure of 12.3 bar and 20.7 bar respectively and is available in 100mm, 150mm and 200mm sizes.

The trim conforms to EN12259-2 and meets the requirements of BS EN 12845. All trim pipework is prefabricated in stainless steel, which reduces the potential for internal or external corrosion, reduced connections minimise the risk of leakage on site and is available fully assembled and tested to reduce the time and manpower required on-site. Other features being cited include its simple and compact design, which reduces space requirement, isolation and test facility on the gauges, a new design for the pressure release ball drip valve and 50mm by 15mm test and drain fitted as standard.

For more information, go to www.reliablesprinkler.com

Gold Standard

FP200 Gold cable from PRYSMIAN has been installed as part of the fire alarm system for a new student accommodation block for the University of Liverpool, Vine Court Residences in the UK, which provides 710 en-suite rooms for students.

FP200 Gold is a 'standard' fire resistant cable that is described as having: "excellent data and signal transmission characteristics and is ideal for fire alarm systems". It complies with fire alarm standard BS 5839 and the emergency lighting standard BS 5266 as "standard" fire resistant cable. Also, FP200 Gold has received BASEC (British Approvals Service for Cables) and LPCB (Loss Prevention Certification Board) approval and includes Prysmian's damage-resistant Insudite insulation. This significantly reduces the risk of accidental damage during installation or third-party damage post commissioning.

For more information, go to www.prysmian.com

ATEX/IECEx Certified Light

APPLETON has announced that its Mercmaster LED series for industrial and hazardous environments that was launched almost three years ago is now certified for use in ATEX/IECEx hazardous locations.

The Mercmaster LED is designed to help keep workers safe in environments containing potentially explosive gas and dust, and is claimed to offer lower weight, greater shock resistance, cold start capabilities, minimal heat production and outstanding energy-efficiency. It features a single-piece, lightweight aluminium body that accommodates upgraded LED arrays generating light outputs from 2,300 lumens to 6,075 lumens, an equivalent of 70W HID to 175W HID lamps. Four lumen output versions are available with universal drivers covering voltage requirements from 120 to 277.

To assist in installation and maintenance, each fixture is supplied with terminals to ensure straightforward wiring, along with a threaded impact-resistant lens for faster removal. A hinge design promotes safety during installation and servicing, while also providing 360° compression on the ballast housing gasket. In addition, the new heat-sink design prevents dust and debris from accumulating on the fixture, while an improved silicone rubber gasket seals out moisture, dirt and dust.

For more information, go to www.appletonelec.com

Fire Testing Lab Re-opened

VETROTECH SAINT-GOBAIN, which produces fire-resistant glass products, has re-opened the International Fire Testing Services (IFTS) facility at its new location in Herzogenrath in Aachen, Germany.

The company carries out over 400 fire tests every year, and tests can be conducted to a wide range of European and international standards for building and marine applications. The new test laboratory has the latest equipment including two test furnaces for elements measuring up to three metres by four metres. An exhaust gas cleaning system offers maximum health protection for staff and customers alike, as well as reducing emissions for the protection of the environment.

In order to officially validate the fire tests, Vetrotech Saint-Gobain collaborates with independent verification and certification agencies such as Underwriters Laboratory (UL), Exova Warringtonfire and IBS.

For more information, go to www.vetrotech.com

Li-ion Battery Fire Research

Commercial and industrial property insurer, FM GLOBAL, has completed the first-ever large scale fire tests of lithium-ion (li-ion) batteries in warehouse storage and released a research technical report describing the associated fire hazards and protection recommendations for these increasingly popular rechargeable batteries.

The project was conducted in conjunction with the Property Insurance Research Group (PIRG) through the National Fire Protection Association's (NFPA) Fire Protection Research Foundation to better understand the fire hazards at the forefront of this prevalent technology.

The key findings of the research included that li-ion batteries present several unique fire hazards when involved in a fire, due to an ignitable electrolyte liquid contained within such products. It also concluded that densely packed li-ion cylindrical cells and polymer cells behave differently than li-ion power tool packs in such fires; also that, when bulk stored in corrugated board cartons, early fire extinguishment and cooling of the li-ion batteries is imperative to properly protect a facility. It was also found that existing protection solutions used for other types of high hazard products and materials can be effective for protecting li-ion batteries stored in bulk arrangements.

The complete research findings are available in a downloadable technical report "Flammability Characterization of Lithium-ion Batteries in Bulk Storage" at www.fmglobal.com/researchreports.

For more information, go to www.fmglobal.co.uk

Hazardous Environment Bulkhead Light

CHALMIT has extended its range of local area LED lights with the new Nevis LED bulkhead light. With a typical output of 4058 lumens and capable of 60,000 hours operation, the robust and corrosion resistant lighting offers low energy use and requires minimal maintenance.

Flameproof, ATEX approved, IECEx compliant and with high ingress protection rating of IP66/67, the light is ideal for offshore and marine operations and in hazardous areas classified as Zone 1 and Zone 21. The LED light enclosure is a robust aluminium die-casting in LM6 high-purity, corrosion resistant alloy with toughened glass lens and long-life stainless steel fittings. A side-mounted increased safety terminal chamber, with easy access for two M20 cable entries, eliminates the need for separate flameproof cable glands. With a total depth of only 200mm, the unit is suited to low profile applications and can be mounted on ceilings, walls, handrails and poles.

Output is not diminished in low temperature environments, and the Nevis will work at temperatures as low as minus 55°C. The use of LEDs also produces a much whiter light with a colour temperature and colour rendering near to that of natural daylight. The Nevis LED is suitable for operation in hazardous and demanding locations throughout the world, with electrical supplies from 100 to 277 Volts AC at 50/60 Hz.

For more information, go to www.chalmit.com

Two Offshore Contracts Awarded

Blast and fire resistant door fabrication and installation company, BOOTH INDUSTRIES, has been awarded two offshore contracts.

The larger of the two contracts is for the supply of stainless steel blast and fire rated walls, doors and windows for the new BP Clair Ridge platforms. Booth will supply over 100 high-integrity stainless steel blast and fire-rated, gas-tight doors that incorporate monitoring switches, speed regulators, electromagnetic hold-open and a facility for emergency escape, even when secured externally. The company will also supply almost 7,500 square metres of stainless steel wind walls, louvers and fire and blast rated wall systems, and will supervise the entire fabrication process.

The second contract was awarded by Kvaerner Stord AS in Norway for the design and supply of a 90-metre long fire and blast-rated escape tunnel for the new Lundin Norway AS Edvard Grieg platform in the Norwegian sector of the North Sea. The company will fabricate the escape tunnel in duplex stainless steel, which will span structurally up to 12 metres between platform supports under blast loads up to 0.4 bar. The tunnel will be designed to withstand a H60 hydrocarbon fire and will be supplied complete with flexible joints, internal lining panels and electrical penetrations.

For more information, go to www.booth-industries.co.uk

Modbus Enabled Seamless Detection

SYSTEM SENSOR EUROPE has announced that its FAAST fire alarm aspiration sensing technology detector now comes equipped with direct Modbus connectivity that will enable seamless integration with building management systems without any additional hardware or software.

According to the company, this additional communications capability will enable more flexible and streamlined system management and will reduce users overall cost as they can access detailed diagnostics and interact with the devices remotely. This is a particular benefit in large systems containing multiple FAAST units, as it provides centralised visibility of all devices.

Integrating the Modbus/TCP protocol within FAAST complements the existing LAN/WAN TCP/IP connectivity. FAAST Modbus connectivity is provided via the device's on-board Ethernet connection, which simultaneously provides direct Internet connectivity and email functionality. As with all of these features, Modbus connectivity is standard at no additional cost, avoiding the need for additional interfaces and Modbus protocol translators in order to implement the functionality.

For more information, go to www.faast-detection.com


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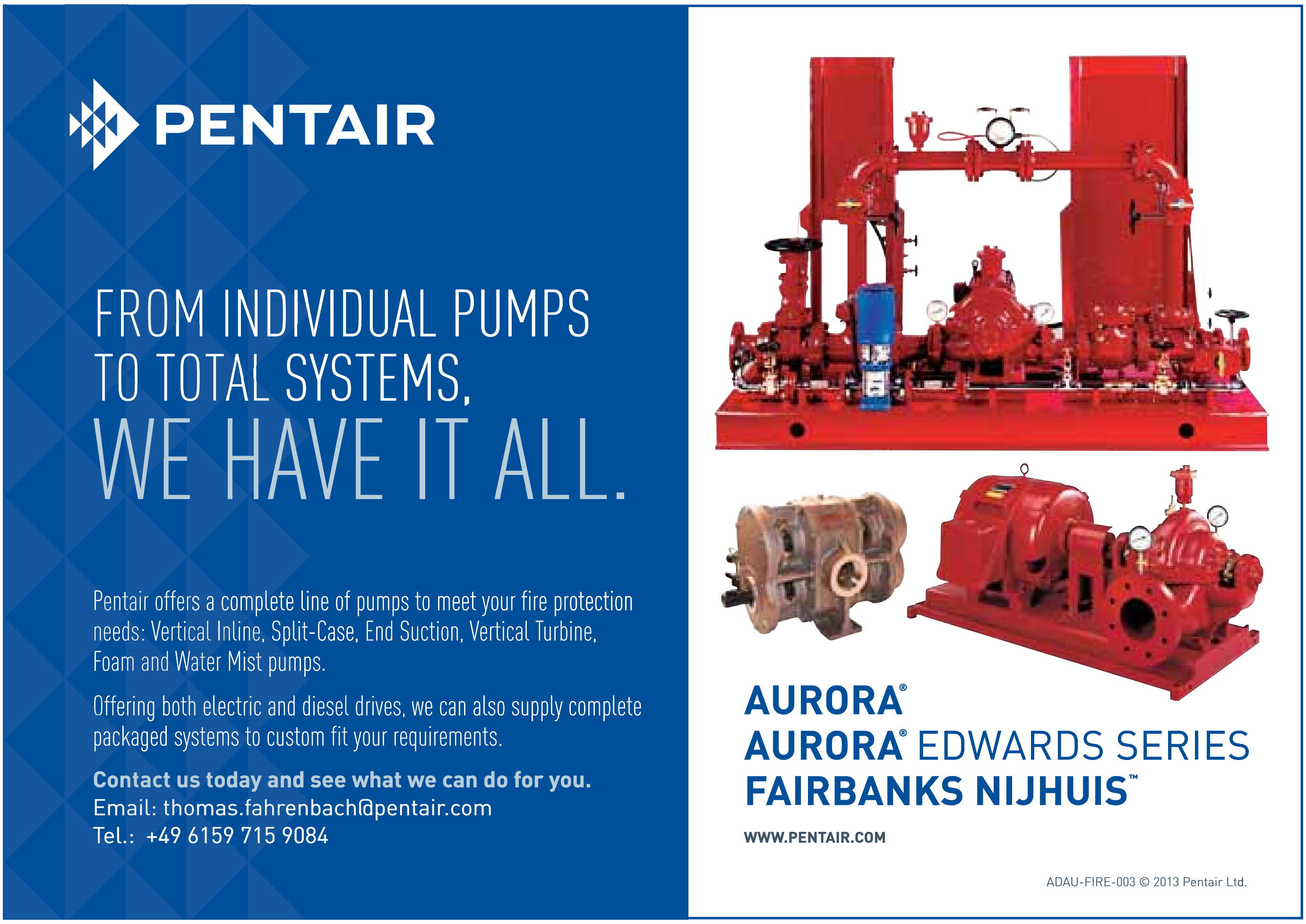
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Charting a New Course in Sustainable Fire Protection

Joe Ziemba

3M

Today, sustainable fire protection is all about minimising impacts on people, the planet . . . and the pocket-book. So, how do fire safety engineers in the Asia Pacific region avoid the pitfalls of the earlier Halon phase-out initiatives?

When talking about the sustainability of a particular technology, the discussion typically focuses on its environmental impact. Environmental concerns are certainly the driving force, but economic and social issues are also important considerations in addressing the sustainability of a given technology. Specific to clean agent fire suppression, the Asia Pacific market is currently experiencing the long-term economic cost of installing, maintaining, and ultimately disposing of Halon, which was phased out by the Montreal Protocol. As usual, environmental and economic sustainability are tightly linked.

Today, as fire protection professionals in the Asia Pacific region transition away from Halon, they have more environmentally responsible replacement options than their colleagues in the USA and Europe had two decades ago. This provides them the unique opportunity to "leapfrog" first-generation Halon replacements such as hydrofluorocarbons (HFCs). HFCs, following the path of Halon, are under increasing global policy and regulatory pressure in favour of alternatives with a much lower environmental impact.

In 1987, an international treaty known as the Montreal Protocol – or to give it its formal title: Montreal Protocol on Substances that Deplete the Ozone Layer – formalised the commitment of the world's industrialised nations to phase out the production of ozone-depleting substances, including Halons used in fire protection. HFCs, which have zero ozone depletion potential but are considered "greenhouse gases" because of their high global warming potential, were broadly

	Atmospheric Lifetime (years)	Ozone Depletion Potential (ODP)[1]	Global Warming Potential – IPCC[2]
FK-5-1-12	0.014 (5 days)	0	1
HFC-125	29	0	3500
HFC-227ea	34.2	0	3220
HFC-23	270	0	14800
Inert gas	0	0	0
Water mist	N/A	0	0

[1]World Meteorological Organization (WMO) 1998, Model-Derived Method.
[2]Intergovernmental Panel on Climate Change (IPCC) 2007 Method, 100 Year ITH, CO_2 = 1.

adopted as first-generation Halon alternatives in much of Europe and North America. As Halon production in "Article Five" countries ceased in 1993, the installed base of HFC clean agents grew quickly; consequently, so have HFC emissions.

HFCs are used in applications such as refrigeration, air conditioning and foam blowing, as well as for fire suppression. These gases have typically been thought to represent a small percentage of the overall greenhouse gas emissions. Nevertheless, as recently reported in the *Proceedings of the National Academy for Sciences* (a private, non-profit society of distinguished scholars, established in the USA by an Act of Congress), if nothing changes, HFC emissions are likely to amount to between nine and 19 percent of global CO_2 equivalent by 2050.

A basic tenet in the emissions scenario for all HFC applications is that a substantial majority of HFCs being manufactured today will ultimately be released into the atmosphere, whether in actual use, through accidental discharge, in transport or during eventual disposal. HFC concentrations that have been measured in the atmosphere reflect this reality.

HFCs on the Regulatory Radar Screen

How does this measured increase in greenhouse gas emissions affect the long-term economic sustainability of HFC-based fire suppression systems? The fact is, HFCs have been subject to increasing scrutiny by policymakers and regulatory bodies worldwide, due to their high global warming potentials, their growing atmospheric concentrations and anticipated future growth. The question is, could this scrutiny ultimately lead to the kind of regulatory action that banned the production of Halons?

For example, on 7th November 2012, the European Commission (EC) submitted its much-anticipated proposal to replace the existing regulation on fluorinated greenhouse gases (F-gases). This new proposal has a twofold objective: to significantly reduce the emissions of these gases, both in the European Union and beyond; and to encourage the adoption of more climate-friendly alternatives.

This new proposal forms a part of the EU's efforts to reduce overall greenhouse gas emissions by between 80 percent and 95 percent by the year 2050, in comparison to 1990 levels. The European Commission's low carbon roadmap sets out a cost-efficient method to achieve this goal through contributions from all sectors and greenhouse gases. This includes fluorinated gases, the emissions of which have risen by 60 percent since 1990 (when HFCs began replacing Halons), even as all other greenhouse gas levels have decreased. This statistic echoes the premise mentioned earlier: with every installation of an HFC-based system, there will inevitably be a rise in HFC emissions.

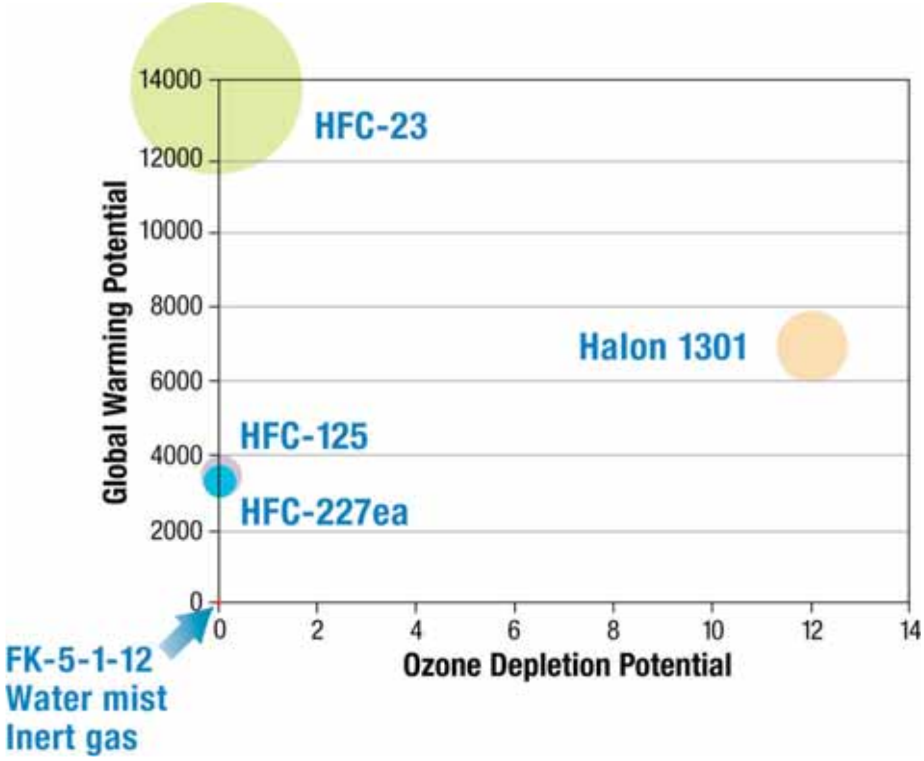
The main new element of these proposed regulations is a cap and phase-down measure that, as of 2015, limits the total amount of HFCs that can be sold in the EU, with sales further reduced to one-fifth of today's levels by 2030. The established quota will be measured in CO_2 equivalent – meaning that producers of HFCs will need to make difficult decisions about how best to allocate their production among their various HFC products.

A basic tenet in the emissions scenario for all HFC applications is that a substantial majority of HFCs being manufactured today will ultimately be released into the atmosphere, whether in actual use, through accidental discharge, in transport or during eventual disposal.

Certainly, there are differences in emission scenarios for the various applications in which HFCs are used. However, because there are no reporting requirements for fire protection products such as HFC-227ea, the volume of emissions from fire suppression applications has not been easy to determine, and different means of evaluating these emissions yield dramatically different estimates.

A recent study of the atmospheric concentrations of HFC-227ea – the most common Halon alternative fire suppressant – revealed trends similar to HFCs sold into other sectors. That is, one would expect HFC-227ea emissions to continue to increase, year after year, as the installed base of systems expands. In fact, HFC fire suppressant emissions are not only growing, but this growth is accelerating. In addition, the HFCs used in fire protection have higher global warming potentials than those used in other applications.

Typical environmental properties of various Halon replacement technologies



This framework does not favour HFCs in fire suppression, because these materials have higher global warming potentials than HFCs sold into larger sectors, such as foam blowing or refrigeration. For example, an HFC producer would consume the same percentage of a quota by making either one ton of HFC-227ea, or three tons of HFC-245fa or five tons of HFC-32. This dynamic brings further uncertainty to the long-term supply and cost of HFCs sold into fire suppression.

Nor is this EU proposal the only pending legislation relevant to HFCs. Similar phase-down proposals have been made under the Montreal Protocol, as HFCs are sold into the same sector as ozone-depleting substances. And in the Asia Pacific region, Australia in particular is taking action. Starting in July 2012, Australia implemented a carbon price as an incentive to use gases with lower global warming potentials. This initiative, part of Australia's Clean Energy Future Plan, is designed to drive down use of HFCs and other synthetic greenhouse gases. Initially priced at AUD$23 a ton of CO_2 equivalent, this amount will gradually increase until 2015, when the price will be determined by the market. HFCs – including those sold into fire suppression – will at that time face an equivalent carbon price magnified by their global warming potential. With the high GWPs of HFC-227ea and other HFC fire suppression agents, this translates to a carbon tax of up to 300 percent, which may prove an insurmountable additional expense for the fire protection sector.

An Environmentally and Economically Sustainable Alternative

The effects of Australia's carbon tax and the constraints of European quotas may well be portents of the future – particularly as viable alternatives are already available for clean agent fire suppression. Next-generation clean agent FK-5-1-12, for example, offers an environmental profile superior to that of HFCs, while still delivering excellent extinguishing performance and a wide margin of human safety. Manufactured by 3M, FK-5-1-12 is an in-kind Halon replacement alternative to HFCs that has zero ozone depletion potential, a global warming potential of only one, and an atmospheric lifetime of a mere five days. This sustainable Halon alternative, branded as 3M Novec 1230 Fire Protection Fluid, can deliver up to a 99.9 percent reduction in greenhouse gas emissions relative to HFCs.

The existence of such alternative chemistries gives Asia Pacific countries a significant advantage. When Europe and North America began phasing out Halons 20 years ago, there were few options available; this has led to the rapid accumulation of HFCs in the atmosphere, and the corresponding regulatory turbulence today. Forward-thinking specifying engineers in the Asia Pacific region have a valuable opportunity to skip directly to third-generation technologies such as FK-5-1-12, avoiding the uncertainty that Europe and North America are experiencing with regard to the future of HFCs.

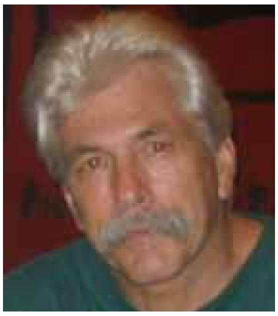
Growing HFC concentrations have clearly caught the attention of policymakers worldwide, and pending legislation is revealing the unsustainable path for HFCs in all sectors – including those sold into fire suppression. HFC emissions are accelerating, making them a target for regulatory action – and the fire protection sector is prepared with readily available, technically sound and cost-effective substitutes.

As was the case for Halon, when considering the likelihood of future regulatory restrictions, supply shortages and end-of-life considerations for HFCs, choosing a more sustainable chemistry is not only the most responsible course of action, it also makes sound economic sense – providing the best assurance that the fire protection system chosen today will still be viable decades from now. IFP

Joe Ziemba is Marketing Manager of Novec 1230 Fire Protection Fluid at 3M

For further information, go to www.Novec.sg/novec1230

ASD in Industrial a Environments: Par



Paul Leslie

Xtralis

In the previous edition of International Fire Protection we discussed the industrial market sector and looked at fire detection equipment selection for harsh environments. This article now looks at the actual approach that should be considered when installing fire detection in these environments and particularly when selecting Aspirating Smoke Detection (ASD).

The Site Survey

Invariable the approach taken by those who design or install detection systems in industrial applications tends to be much the same as that taken when dealing with cleaner environments. Minimal thought is given to the actual site application; there is a limited understanding about the facility, the processes that may take place or the environmental conditions, inevitably leading to an undesirably installed system.

A thorough site survey of the facility is fundamental to ensuring the correct system design and one of the key critical steps that should be undertaken when planning an ASD system. Of course this is not always possible, particularly when the project has not yet been constructed, however where this can be undertaken it is strongly recommend that a site visit be made. Further and to gain the best understanding of the site and conditions, get the client thoroughly involved.

Client participation provides advantages in that many things are revealed about the site that may not be evident when simply doing a walk around or designing from drawings. An ASD system design should begin with beneficial knowledge where client participation is included.

Here are some points to consider when conducting a site survey. Familiarise yourself with the entire site and operation, including:

- Building/Application construction and neighbouring businesses.
- Production/processes and activities undertaken.
- Working operations/changes throughout a given year.
- What takes place, how, when and where.
- What and where are the fire hazards/risks areas of concern.
- Consider the building height and access to detection.
- Note ventilation whether natural or forced.

Get to know the environment:

- Air flow movement/speed.
- Contamination situation – Dust/smoke/other airborne pollution – chemical contaminants, etc.
- Summer/winter temperatures/stratification/humidity/moisture.

Client involvement:

- Ask questions – Ensure the end user understands what can be offered – the benefits and limitations of the proposed system.
- Draft a brief letter/report of your findings and intentions.

nd Harsh
t Two

- Set down details if need be so that all parties are clear as to what the system can and can't do.

Smoke Testing & Design Considerations
Uncommon as it is, smoke testing is the best way to determine the way in which air behaves in a given environment and should be conducted only with the approval of the client. If possible have the client present. A greater understanding of the site conditions is possible with smoke testing and early detection effectiveness can hinge on where detection (ASD sampling points) is located.

Since each application is individual, each will also have different conditions; building size, shape, roof height, machinery, equipment, processes and so on, all of which will impact on the way air moves. Is air movement always consistent, what happens when doors or shutters are closed, does the pattern change if these are left open? The pipe system layout must be harmonious with the air movement, after all this is what ASD is all about.

Many applications will be relatively straight forward, others more difficult and some will even require special engineering techniques to operate in conjunction with the ASD system. Regardless of the type of application, environment, size and shape, to ascertain the correct location of the ASD sample pipe and sampling holes smoke testing should be conducted.

It may be that some applications will require a "performance based" approach, not necessarily one where there is a need to engage specialist fire consultants to engineer the design, but more simply a practical or common sense view to the application whereby it may be advantageous to undertake smoke testing and trial a system to evaluate its effectiveness. Fire detection systems are not always a mandatory requirement in industrial applications.

Certainly there will be those specified applications where fire consultants have been engaged and instances where meeting prescriptive requirements could be a hurdle if effective detection is to

Typical countersunk hole

Hole without countersinking

Dirty, but not blocked)

be met. In these situations the appropriate authorities as necessary may need to be consulted if a prescriptive requirement can adversely impact on the detection capability. While fire system design in the main must comply with the requirements of codes and standards prescriptive layouts are not always practical or the best way in which to detect fires in certain industrial applications

Smoke emitters are typically the best way to conduct testing. They provide a good indication of air movement but must also be done in several locations to gain the best appreciation of air movement. Regin or Ventax smoke emitters are available in different sizes from air conditioning companies and are ideal for this purpose. Coloured smoke emitters are sometimes used to demonstrate to the client the effect of smoke dilution.

Sampling Pipe Installation Considerations

While the installation of sampling pipe is important in any ASD application, it is perhaps even more so when installing in hostile environments. The sampling pipe network may also seem somewhat insignificant to some, and is, from time to time subcontracted to inexperience installers who treat it as just another "conduit run".

An ASD pipe network is the foundation of the system and a good layout is critical to the overall performance. Sampling holes in industrial ASD system designs are typically larger than those used in cleaner environments, generally around 3 mm or larger and performance must be carefully modelled using appropriate software. It is also recommended that holes be "countersunk". Countersinking of holes minimises contamination build up at and around the hole and assists by creating a mini "venturi" effect, allowing contaminates to be easily drawn back to the detector where they are dealt with through efficient filtration.

Air Flow

Air flow is the very essence by which this technology functions, so why is it that many tend to forget this basic concept?

We must get this part of the system correct and working in partnership with the detector, otherwise we can forget the whole deal – the system will not perform satisfactorily. No matter what type of detector, controls or type of flow sensing is employed within a detector, implementing a few simple measures can result in a more stable system. A well-designed pipe network can also assist in fault finding any air flow faults that may be associated with environmental disturbances, those not necessarily a result of the system design.

The smoother the air flow can move within the pipe, and with minimal interruption and friction, the better the whole system will function. Sampling pipe leading directly into the detector ports for example should be straight and without out interruption, that is, at least 500 mm of free pipe should be installed between the detector and before any bends or pre-filtration or any other in-line components are added.

This consideration rules out any possible flow turbulence issues that maybe created when air is immediately being drawn into the detector.

Some other simple measures include:

- Ensuring all installed pipe runs are straight without sagging and fixed securely at appropriate intervals. If this means closer spaced fixings than that required by local codes or standards require, then so be it.
- Consider expansion & contraction joints – Sampling pipe at roof level in metal buildings will inevitable be influenced by building movement.
- Always install long radius 'sweeping bends' to assist flow and minimise contamination build up at bends – "T" joints and elbows while suitable in clean applications are not recommended in industrial environments.
- Minimise pipe joins and ensure the correct glue is applied for the type of pipe used . . . and make sure it is applied sparingly.
- Consider 'catenary' cable where access may be difficult or where obstructions create the need for more bends. Sampling pipe affixed to catenary cable allows straight and true installation of pipe.
- Consider hole orientation.

ASD System Engineering

There are many ways in which to approach, adapt or enhance the performance of ASD in industrial facilities to ensure the best possible operation and performance. Many system installations are straightforward; others, due to their location, operation and the site conditions require some level of system engineering, that is, the use of additional measures to perform reliably within the environment.

This task is made considerably easier if the detection equipment is purpose built such as that offered by Xtralis. The (VLI) "Industrial" detector was specifically designed and developed for use in hash and difficult environments.

My experience over the years has shown that when designing ASD systems for the industrial

market sector, one must also be conscious of the possible and various pitfalls, often unclear to those with little ASD installation experience or those that have only applied ASD in cleaner environments.

Temperature variations and humidity can create unforeseen issues. Sometimes a detector can be located only in the area in which it is to detect and where high and low temperature conditions exist. Applications where hot, cold, humid or wet conditions exist may require some system engineering. Similarly protecting the pipe network from extremes of temperature may mean installing specific types of pipe. Metal can be used, in fact copper, stainless steel, HFT and other similar pipe is acceptable and has been successfully used.

Protective enclosures may also be required for equipment to guard against tampering; process washes downs, steam or any other on site environmental condition. Detectors may require cooling in some instances, which can be accomplished through simple thermoelectric cooling, air can also be cooled using other techniques. Perhaps specific chemical pre-filters may be needed to assist in minimising the impact of background air contamination before it enters the detector, this can be done thus protecting the internal detector components from corrosion. Whatever the conditions, ASD in most situations can be adapted and various methods of system engineering applied.

Detector Contamination

It is no secret that aspirating smoke detection was conceived and developed for use in "clean" environments, that is, telecommunications, data centre and computer room type applications.

Switch rooms, control centres and the like are also typical applications where ASD is the chosen product and where very early warning is accepted as the best technology. However let us not forget that it has also proven itself time and time again in hostile environments, and although there are still perceived views within the fire industry that ASD is unsuitable, thousands of systems have been installed globally for over 25 years.

The one very important fact associated with any detection equipment used in industrial environments is that, it will suffer the effects of wear and tear and particularly contamination impact. Regardless of the technology, whether photo-optical, point, ionisation or laser, equipment deterioration, is inevitable . . . even with ASD systems.

Since ASD systems actively draw in air, together with whatever contamination there may be in the environment, management of contamination is essential. Minimising the impact on the equipment requires good physical filtration. Unless this is addressed correctly contamination will ultimately compromise performance and the serviceable life of the equipment. An ASD system proposed for use in hostile environments must be equipped with the best filtration measures possible if it is to survive.

With the increase in ASD products globally each manufacturer has developed varying ways in which to deal with contamination. Some detectors draw in 100 percent of the environment air without filtration relying on complex algorithms and other measures to manage dust contamination, at the same time suggesting smoke can be detected effectively. Others use minimal or basic mechanical filtration methods and only apply pre-filters in

Warehouse environment with heavy build-up of dust on boxes

applications that really warrant.

Suffice to say that any aspirating smoke detector not designed for the environment will draw in contaminated air and without the proper filtration will experience the effects.

Pre-filters have become a part of ASD systems used in many hostile environments. However, there is one important aspect that must be made clear and an issue unknown to many who install and maintain ASD system in these difficult applications – pre-filters are not monitored.

When pre-filters begin to accumulate a certain level of contamination they will not allow smoke to be drawn to the detector. This phenomenon is termed "smoke attenuation". The pre-filters can become contaminated to such an extent that only air will pass through. It is difficult to say how long this phenomenon will continue before an actual air flow fault is raised since all ASD systems are different. It will also depend upon the type of contamination within the environment. A time frame anywhere from a week to perhaps months is not unusual. The issue arises when the maintenance regime applicable to the pre filters is not strictly followed. The required level and frequency of maintenance depends upon the application and the environmental conditions but the underlying concern is that a period of time can pass where the ASD system will not effectively detect smoke.

Xtralis has recognised this problem and developed for the industrial market a specific detector that incorporates a monitored "Intelligent" filter within a purpose-built detector designed with contamination in mind.

ASD System Maintenance

I have said that industrial applications comprise many different environments and conditions and as such the degree of preventive maintenance for each must be considered in line with the type of contamination and concentration level within the area. Environments with low levels of background contamination may require only preventive maintenance as set down by the manufacturer in its product manual. However, where contamination levels are more severe additional preventive maintenance will be required.

In addition to the detector and pipe network a certain level of attention must also be given to any other ancillary equipment associated with the system, for example:

- Chemical pre-filtration – Media must be checked and changed regularly.
- Water traps/coalescing filters/driers – These must be checked periodically to monitor either water build up or evaporation.
- Back flushing – A practice regularly implemented to clean the pipe network in hostile environments.

This equipment may either be manual or automatic and any components associated with this set up will need servicing.

Maintenance can be conducted by the original installer or an authorised distributor or well-trained service contractor. Some companies specialise in the maintenance and service only of fire systems becoming well versed in what is appropriate, what works and what does not.

In all, industrial sites will require a more rigid level of maintenance and service than cleaner applications.

Are all ASD Systems Suitable for Industrial Environments?

This is a question that can be answered only after the proper evaluation of the various ASD products available to the market. We are all pretty much aware that equipment manufacturers push the worth of their products over that of their competitors and here, once again the user, specifier and fire contractor is faced with a choice, albeit now to do with the selection of an ASD system.

Having stated that any fire detection equipment used in hostile environments will suffer the effects of contamination it is important to recognise that even among ASD products all is not necessarily equal. Each manufacturer's equipment must be carefully analysed to ensure suitability for the application and conditions. Fortunately this evaluation process can be made simpler if consideration is given to "Independent" third part product testing.

Interestingly Hughes Associates, Inc. (Fire Science & Engineering) (HAI) in the USA conducted a webinar in July 2012, entitled "Testing & Verification of ASD Products in Different Environments". HAI witnessed and verified testing of several manufacturers ASD products.

Testing was undertaken to assess ASD performance under different environments as may relate to different applications. ASD technologies can have different detection principles and methodologies and as such can perform differently relative to the application and environment. Several product brands were tested with varying results. Not only were products tested for clean environments but also for industrial environments, the aim to better understand the features and options available in ASD technologies and their performances in these various applications and environments.

With regard to "industrial" application testing the focus was on determining the performance of ASD as a technology in these environments by evaluating:

- Detection performance in moderately high airflow environments.
- Test performance of ASD with automatic alarm threshold adjustment algorithms to slow smoke growth scenario.
- Test performance of ASD in moderately low ambient background smoke levels.
- Test ASD long-term performance to impact of contamination on hardware.
- Comparative assessment of detection response to smoke and dust sources.

In a further attempt to establish the suitability of ASD products in industrial or hostile environments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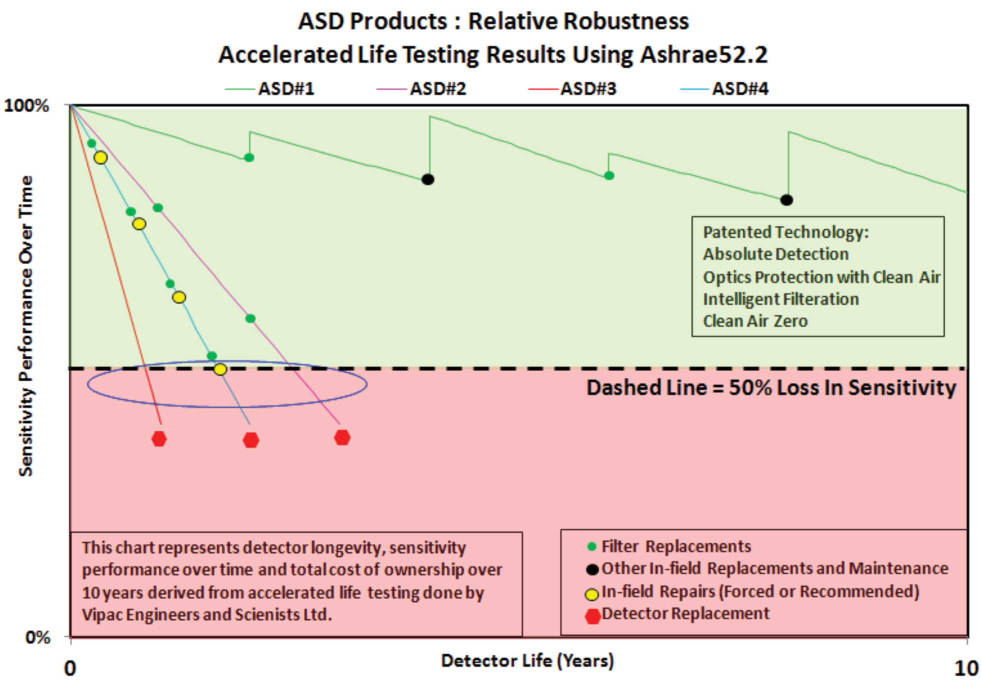

Vipac engineers and scientists also conducted some testing of a number of current market available ASD products. The testing was very specific, relating to "accelerated life testing" using Ashrae 52.2 standardised loading conditions (dust).

Four commercially available ASD products were chosen and tested. The detectors selected were those where the respective manufacturers market their products as being "suitable" for use in industrial environments and conditions which could be considered harsh or hostile. Subsequent to the vipac testing, the following chart was developed to indicate the results. The outcome is surprising and certainly shows that not all detectors will offer the same performance when exposed to dust.

I might add that the chart has been modified slightly for this article and the four detectors tested have been indicated only as ASD #1, #2, #3 and #4.

Testing showed that detector #3 had a relatively short life cycle and could sustain operation only over a short period before replacement was required. Detector #4, while having a slightly longer life cycle, did require both frequent filter replacement and repairs. Repairs typically relate to aspirator and/or sensing chamber diminished performance or failure. Some component failures can be addressed in the field, others require return to the manufacturer. Detector #2 experienced better performance than #4 and #3 although its life cycle was also less than desirable. Only one detector, #1, showed that it could sustain a substantial life cycle at the same time deal with the effects of dust.

Perhaps the most critical aspect observed with this testing is that of deteriorating detector sensitivity. Three out of the four detectors showed significant sensitivity loss during testing. This is certainly a major concern when selecting equipment for these environments, after all this is about detecting fires early and effectively is it not?

So, what is the aim of all this? The overall aim and subsequent results of any independent third-party testing is to establish the suitability of fire detection equipment to do its job in the application and environment for which it is intended. Educating practitioners and others about the correct selection of any product including ASD and its true performance in industrial environments can lead only to better installed and performing systems with ultimately less likely problems and nuisance alarms.

Summary

Air sampling smoke detection has come a long way since its inception. Today there are many global manufacturers with a host of products. The detector is only one part of an ASD system and managing performance in both clean and difficult/dirty environments with this technology requires knowledge and experience.

To provide the best possible fire protection for an industrial application/environment means selecting the correct technology and the most appropriate product in the first instance. It must be purpose built and be able to withstand the conditions on site providing efficient and effective contamination management. The detector must maintain its sensitivity over the life of the detector and provide a low total cost of ownership.

A practical and cost effective design that includes the pipe network is also a significant factor if the system is to offer performance with low maintenance for the expected life of the equipment. Most importantly, the system must be installed, commissioned and maintained correctly with follow-up checks to make the necessary adjustments that were either known or unexpected at the design stage. A good system, designed with adequate capacity will be able to be 'fine-tuned' post installation to ensure the expected performance for the end user.

Finally, ASD systems can perform in industrial applications and environments but should only be designed and installed by those with knowledge and experience. If you don't have the knowledge and experience, get it! IFP

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The Case for Automatic Water Suppression

Steve Seaber

British Automatic Fire Sprinkler Association

Automatic water suppression systems are increasingly being installed during the refurbishment of properties and the redevelopment of existing buildings. The wider use of these systems is due in part to an increased awareness of the benefits in protecting occupants and buildings together with the life-long cost effectiveness of these systems in comparison with other fire protection measures.

The availability of new, modern materials such as CPVC piping and other lightweight materials has also assisted. These materials are easier to handle and reduce the installation time over more traditional materials, as they do not require hot working and heavy-duty equipment. Installation is quicker with subsequent reduction in disruption to occupants.

Relaxation of Regulatory Requirements

Automatic water suppression systems have been specified in a number of refurbishment and conversion projects. Their use permits relaxation of the requirements for fire resistance, compartmentation, means of escape, travel distance, fire detection and alarm systems, separation distances between buildings and fire service access.

The scope and scale of this flexibility in the UK is provided in Approved Document B of the Building Regulations and Scottish Building Standards. Further guidance is contained in two British Standards: BS9991:2011 (Code of Practice for Fire Safety in the design management and use of residential buildings) and BS9999:2008 (Code of Practice for fire safety in the design, management and use of buildings).

These standards offer the middle ground in terms of flexibility, as they sit between Approved Document B and the fully engineered approach and the fully engineered solution approach of BS PD 7974:2001 (Application of fire safety engineering principles in the design of buildings, Code of Practice). It is important though that where such flexibilities are being considered that the authority having jurisdiction should be consulted.

Developers that have utilised sprinklers in the design of refurbishment projects have identified that they provide design freedoms, cost savings and, as in the case of UK Factory Mutual when undertaking a refurbishment of its offices and retrofitted sprinklers at a cost of £10,000 for each floor, ensure the project is more cost effective. Information from developers and organisations such as housing associations suggests that the cost of installing sprinklers in refurbishment and conversion projects is in the region of one percent to two percent of the total project costs.

Enhanced Fire Protection

In addition to installing suppression systems as part of an overall refurbishment or the conversion of existing buildings, a number of housing and social care organisations are retrofitting suppression systems into a range of high-rise and low-rise social housing.

The systems are being installed as a result of the findings in fire risk assessments required in the UK under the Regulatory Reform (Fire Safety) Order 2005. The outcome of many of these has been to identify shortcomings in the fire protection measures such as compartmental fire resistance, condition of fire doors and fire alarms. This is supported by the evidence from a number of fires where passive fire measures have not performed as expected.

An example of this is Lewisham Homes where an intrusive risk assessment and structural survey was carried out in Somerville House, a two storey block containing 26 flats utilised as extra care sheltered housing. This identified a number of concerns with regard to the effectiveness of the fire protection arrangements. In considering the possible remedial actions a cost/risk benefit was carried out that compared the cost of upgrading and reinstating the passive fire protection with the cost of retrofitting sprinklers. It was decided that, in view of the full life costs and enhanced safety provisions, that a sprinkler system would be retrofit to the building.

The installation of sprinklers in Northampton House, a former office block, was approved by both the building control body and fire & rescue service as an alternative to the requirement for a second firefighting shaft and mechanical ventilation. Sprinklers were more cost effective and allowed the developer to create an additional flat on each floor.

Callow Mount Sprinkler Retrofit Project

Following a major fire resulting in six deaths in 2009 in a social housing block, Lakanal House, questions were asked about the potential benefits in protecting residents in such properties. In response, a Department for Communities and Local Government (CLG) report suggested that retrofitting sprinklers to such buildings would not be cost effective or practicable.

In 2011 the BAFSA (British Automatic Fire Sprinkler Association), on behalf of the Sprinkler Co-ordination Group (SCG) agreed to lead and manage a project to retrofit a system into an existing, older occupied high- rise social housing block built in the 1960s.The project was designed to determine the real costs, both financial and societal, of retrofitting an automatic sprinkler system, while identifying the problems of doing so and developing guidance that can be used elsewhere.

The installation into the 13-storey bock containing 47 flats was completed in exactly four weeks without the need to decant the residents. The project provided definitive evidence of the initial and full life costs of installing sprinklers into this type of property. This BAFSA sponsored project to retrofit sprinklers to a high rise social housing block, together with installations in other social housing premises has provided both practical experience and identified potential costs.

It is important that where a system is being retrofitted that residents are consulted fully to understand how sprinklers work, how they will enhance the quality of fire protection and that the system is relatively easy to install with minimal impact while they are still in residence.

Conclusion

An increasing number of developers and building owners are installing sprinklers in premises that they are refurbishing. Systems are also increasingly being retrofitted to a range of social housing properties. In addition to the additional protection offered to occupants, the decision to install the systems is seen to provide significant design freedoms and to provide a whole life cost benefit compared with other measures. IFP

Steve Seaber a member of the Council of the British Automatic Fire Sprinkler Association

For further information, go to www.bafsa.org.uk

Tunnels – Human B Evacuation Strate

Nicole Hoffmann

Parsons Brinckerhoff

When we mention 'human behaviour' in tunnels in relation to a fire incident, the assumption is often that it refers to the tunnel occupants and their behaviour; how they might react and what choices they might make over evacuation. However, over the years, having been involved in the development of numerous fire and evacuation strategies, I feel that human behaviour is not only concerned with the tunnel occupants but, in the broader sense, also relates to designers of the tunnels, infrastructure operators, engineers and the emergency fire services. All of these parties are involved with a tunnel during the various stages of its life.

One aspect in common is behaviour and how we all think in terms of assessing and perceiving risk, gathering cues about danger and the need to evacuate, training we have undertaken, our motivations and actions.

As I am not a psychologist, I have listened and learned from professionals like professors Jonathan Sime and Alan Marsden and many others who try to gain further insight into how we think and react. Studies such as familiarity, and how likely people are to use the routes they know as opposed to those they do not; cues or instructions, and whether there is a difference between how people respond to, for example, an alarm sound, a message or direct verbal instructions. There are also issues related to areas such as affiliation and hierarchy, within a family unit or through work, which can have an impact on the perception of authority.

There is considerable overlap with these brain activities for all of our four subgroups; the designer, user, operator and emergency fire services, and how awareness of each other's roles interacts, which I want to explore in further detail.

It is always interesting to look back and learn how tunnels and their uses have developed; how human ingenuity, risk awareness and the design process have shaped and formed our tunnel world.

Back in 1828, Brunel started the construction of his first tunnel underneath a waterway. He completed it in 1843. It was designed for Victorian Londoners to perambulate and take their horses 'across the water'. But it was not a big success. In 1865 it was purchased by the East London Railway company, which wanted to use the link to transport both passengers and goods for the new railways, with the first trains using it four years later. From a fire engineering point of view this was an interesting change of use, as the potential fire load within the tunnel had increased.

The idea 'wouldn't it be nice if there was a tunnel between France and the UK . . .' was apparently first thought about during the Napoleonic Wars. In 1993 the channel tunnel rail link opened. But it was not just a tunnel in the way that engineers in 1802 would have envisaged it, but an engineering feat of ingenuity, displaying a quest for safety measures. And the push of the envelope for humans in tunnel environments continues. Very long tunnels like the Gotthard base tunnel, at 57km, are not only pushing the engineering, but also safety, to the heart of the design process.

Road tunnels too have been modified to address not only the level of comfort that users demand, but also the level of safety. Mont Blanc is one example where new evacuation routes have been provided to an existing infrastructure to address the various changes related to traffic as well as design standards. Once again human ingenuity, design and human factors are key players in this development in designing and providing tunnels.

ehaviour & gies

Over the centuries, lessons have also been learned from accidents, traffic levels, travel habits and styles, which all impact design. This is clearly demonstrated by the numerous national and domestic standards and guidance documents that have been, and continue to be, developed and published by organisations such as Highways Agency, NFPA, PIARC (Permanent International Association of Road Congresses), European Railway Agency, STUVA (Studiengesellschaft für unterirdische Verkehrsanlagen or Research Association for Underground Transportation Facilities) and HSE. These documents have on-going revision cycles to ensure that the latest experience and research is incorporated. The human behaviours of learning from experience and sharing that information, are clearly demonstrated and of critical importance here.

With our 'need for speed' in terms of connectivity between cities we are providing our customers, the tunnels users, with not only faster travel connections but also choices. If for example someone wants to travel from Frankfurt to Milan, they have the land-based transport choices of road and rail. The internet provides us with a quick assessment of cost and time comparisons, which are relatively evenly balanced. However, a person might also consider the level of comfort and flexibility of the mode of transport, as well as alternative uses for the travelling period, such as working on a train, catching up with emails or perhaps adding finishing touches to a presentation.

However, one aspect that the user would probably not consider is whether or not the route passes through a tunnel. Why should that make a difference? Nothing is going to happen. But unlike perhaps in offices where occupants are regularly trained to be aware of fire alarms and evacuation routes to a muster point, how many people would know how and what has been designed for the eventuality of a tunnel evacuation? What experience or knowledge would most people have of what to do in an emergency? What does an emergency even look like? How different will the behaviour be between people travelling on their own and people travelling with young children or elderly parents? Are there any mobility impairments? Additionally, are their potential language considerations for informing users both verbally and through the use of signage? Who is communicating with them? Who is in control?

From a designer's point of view, we see the whole tunnel and provide the necessary details; work through the different 'what if . . .' scenarios and know, for example, that in an emergency you walk through the cross-passage into the adjacent bore. But how do the users know that? Where does the door lead to?

The evacuation strategy is for life safety of all tunnel occupants and relies heavily on self-evacuation similar to many other built environments. However, familiarity and potential training of users should not be considered trivial. Information flow in an emergency is an important consideration, linking up users with the rail or tunnel operators. The evacuation of aircrafts has shown a clear link between staff interaction with passengers and their motivation to clear a plane. But our training as passengers starts prior to taking off with the safety video and demonstration and the words: 'In the unlikely event that . . .'.

There is some compatibility with train travellers; in as much that passengers are confined to a mode of transport. Like aircrafts, general emergency information and instructions can be displayed on-board; even animations can be seen on modern entertainment systems. Similarly train staff and control centres have communication devices to inform passengers why the train has stopped in a tunnel, and provide instructions on how to evacuate the train and the tunnel if necessary. In such a situation, staff would be able to lead the evacuation and assist passengers in exiting the train safely.

In both these cases, there are people trained who take a lead and provide instructions, and authority in an emergency. However, in road tunnels the situation by its very nature is far more complex.

Road tunnel operators are attempting to address this by producing leaflets for drivers to provide insight into emergency information, from radio transmission, emergency telephone numbers and tunnel schematics including emergency exit provisions. But it is down to the road user to read and digest these. One recent initiative I was made aware of in one country is for drivers to be trained to drive within tunnels as part of their lessons and tests.

In an emergency, it is the operations room which could be described as the brains or nerve centre of an incident; gathering information, assessing what to do next and passing information on. It is within this hive of activity, which goes from zero to 100 in a very short time-span that further human behaviour needs to be considered. Depending on the fire safety strategy and the fire safety systems provided, particularly the tunnel smoke ventilation system, a lot of actions and decisions are required. A task analysis for each of the roles and staff in a control room will provide insight into ensuring that all required actions can be performed. This in turn assists in developing the appropriate staff training for tunnel emergency situations.

What the above has tried to briefly outline is that there are a considerable number of human behaviours and interactions involved when considering the impact of fire in tunnels. This includes the designer involved at the beginning of the life of a tunnel through to the users and the operator, and the challenge of training and informing all parties, including the operations team that controls an incident.

This all amounts to a fascinating and complex psychological challenge, from which we are continually learning new procedures and best practice as the boundaries get pushed ever further by the development of yet more challenging transport infrastructure. IFP

Nicole Hoffmann is Principal Fire Engineer at Parsons Brinckerhoff

For further information, go to www.pbworld.com

Cracking the Fire-r

Water spray in the cable fire test

Simon Hopkins

Prysmian Cables

What changes were brought in with BS 8519 and are there still 'crossed wires' regarding its application for the specification of fire-rated cables.

Is the phrase 'large and complex building' too ambiguous? On the surface it may seem simple enough but, in the case of British Standards concerning fire-fighting and life-safety systems, there seems to be some uncertainty.

Having unclear parameters to define this term may be troubling territory, especially when it comes to the selection and installation of fire-resistant cable systems for life-safety and firefighting applications. These systems are understandably crucial for larger buildings with greater levels of occupancy or a high frequency of people traffic. More importantly they must have a high level of fire performance, set out specifically in BS 8519 [*Selection and Installation of fire-resistant power and control cable systems for life-safety and fire-fighting applications*] when installed in large and complex buildings.

So we see that a clear definition is vital. Reasonably, the term should incorporate multi-use buildings, high-hazard structures, large leisure or health facilities, and high-rise buildings for both office and residential use.

The building services engineer is not responsible for deciding the fire strategy or class of building but they do have the authority to apply the best practice when designing life safety and fire fighting systems. An approach may be to design and install the cable system appropriate for large and complex building that will allow for evolution and modification over time.

UK Building Regulations, Clause 5.38 of Volume Two (for buildings other than dwelling houses) of Approved Document B, recommends that houses with significant 'multi-occupation' could also fall under some of the guidelines for larger, complex buildings.

It is so important to understand this terminology particularly in the wake of the publication of BS 8519, which replaced the now withdrawn BS 7346-6:2005, because one of the major changes brought in with the new code is its specific application for large and complex buildings. The new code has been expanded to include all life safety and firefighting systems, not just smoke venting and firefighting cores (or shafts). These include sprinkler pumps, wet riser pumps, firefighting and evacuation lift-supplies and fire barriers.

There have also been notable changes to the technical guidance for the selection and installation of the fire-resistant cables that control and power these systems.

Document B

Approved Document B of the Building Regulations states in clause 5.38 "In large or complex buildings there may be fire protection systems that need to operate for extended periods in a fire." This is defined by UK law.

Power cables, the vital connection between life-safety/fire-fighting systems and the primary distribution board, should be high-performance, armoured and robust. BS 8519 places much greater emphasis on the integrity of the electrical circuits that maintain the functional safe working conditions of such equipment and systems. Power cables must meet the much more onerous fire resistance requirement now considered appropriate for such applications.

As part of new guidelines, BS 8519 requires that high-performance power cables for life-safety and fire-fighting systems meet the test requirements of BS 8491, which has been developed to provide assessment of energy cables larger than 20mm diameter. The test incorporates flame, direct

ated Cable Code

mechanical impact and water jet, over three time periods up to two hours. The enhanced performance categories are classified as F30, F60 or F120, reflecting the duration of the test in minutes.

Water Jet

A test incorporating water jet conditions is a welcome amendment too, as it provides a harsh environment and is an attempt to represent both the physical and electrical stresses placed on the cables during a fire and the methods firefighters need to use. The premature failure of the power cable supplying life safety and firefighting systems would be disastrous; potentially harmful to occupants and hindering the efforts of firefighters and other emergency services trying to save lives, tackle the fire and minimise property damage.

The possible failure of cables in these systems would be increased by ignoring the selection and installation recommendations laid out in BS 8519. While still in its relative infancy, awareness of BS 8519 is increasing. Alongside the potential ambiguity of associated terminology, in 2011 there was a concern that insufficient efforts had been made to inform electrical contractors of changes to the code and the new test requirements.

Strict adherence to the new code may also be hindered by the remaining international market presence of cables that only meet the requirements of the long-established BS 6387 standard fire test. However failure to comply with the new code cannot be blamed on a lack of available compliant cable as an alternative. Prysmian's FP600S is an example of a robust high-performance, fire-rated cable, for use as a power cable in firefighting and life safety system installed in large complex buildings. It meets or exceeds the test requirements for fire survival time in all three categories.

Cable Fixings

Likewise we come on to cable fixings. BS 8519 has much clearer guidelines concerning the manner in which the cables powering life-safety and fire-fighting systems are installed and fixed.

Naturally, a cable fixing or cleat with a level of circuit integrity below the strict one insisted upon for the cable it supports can compromise the circuit entirely. The new code recommends cable fixings and cable management systems must function under the same onerous fire, direct mechanical impact and water jet conditions as the fire-rated cable does. Again, some fire-rated cable manufacturers, producing cable at the high fire-resistant standard levels laid out in BS 8519, will provide fixings that are designed specifically for these cables and meet these same arduous test procedures.

For the robust FP 600S, Prysmian manufactures a range of cast iron fire-resistant BICON cable cleats. These metallic fixings utilise iron rather than aluminium or nylon, both of which melt at a lower temperature than the test requirements of 930°C. Cast iron is the ideal material to help the cleat maintain the circuit integrity of the cable and BICON cleats also ensure a very secure fix. Prysmian offers data sheets to accompany its fixings in order to try and eliminate misperception around specification as well as a downloadable guide to BS 8519 again to heighten awareness and temper confusion.

FP600 cable under fire test

Power and Control

Cables can be wrongly promoted under BS 8519 due to a misunderstanding of which cables must meet which test requirements. There can be incidences of fire-rated cables being marketed as testing to BS 8519 without the distinction being made, by the manufacturer, as to whether they are compliant as power or control cables.

BS 8519 recommends separate guidelines for control cables with very similar fire-resistant test requirements as power cables (though different to the high-performance three-phase power cables). However some Category 1 control cables only need to be tested to BS EN 50200:2006 and, because this is an agreed test condition in BS 8519, these cables could then be misappropriated as suitable for power applications. While this is rare, it highlights the need for a clear and greater awareness of BS 8519; the changes that have come with it and the terminology it utilises.

House building may be at a low in the UK but across the great cities of the world our skylines are punctuated with cranes building the new structures for large and complex building. They are being constructed as buildings we shall use every day: offices, leisure facilities, hospitals and sports venues. Last year the world witnessed events take place under the banner of London 2012: The Olympic Games and the Paralympic Games used huge permanent and temporary venues accommodating thousands of competitors, spectators and games-makers in safety. FP600S was specified and installed for several of the larger and prominent Olympic venues because of its high performance as a fire-rated cable and for its compliance, under BS 8519, as the power cable for life-safety and fire-fighting systems.

BS 8519 is a code of practice for the correct selection of these cable systems. Its ideal accompaniment is diligence on the part of those designing, installing and commissioning life-safety and fire-fighting systems. Specifiers and installers can act with confidence when they utilise datasheets and technical help from fire-resistant cable and accessory manufacturers. IFP

Simon Hopkins is FP Product Manager at Prysmian Cables

For further information, go to www.prysmian.com

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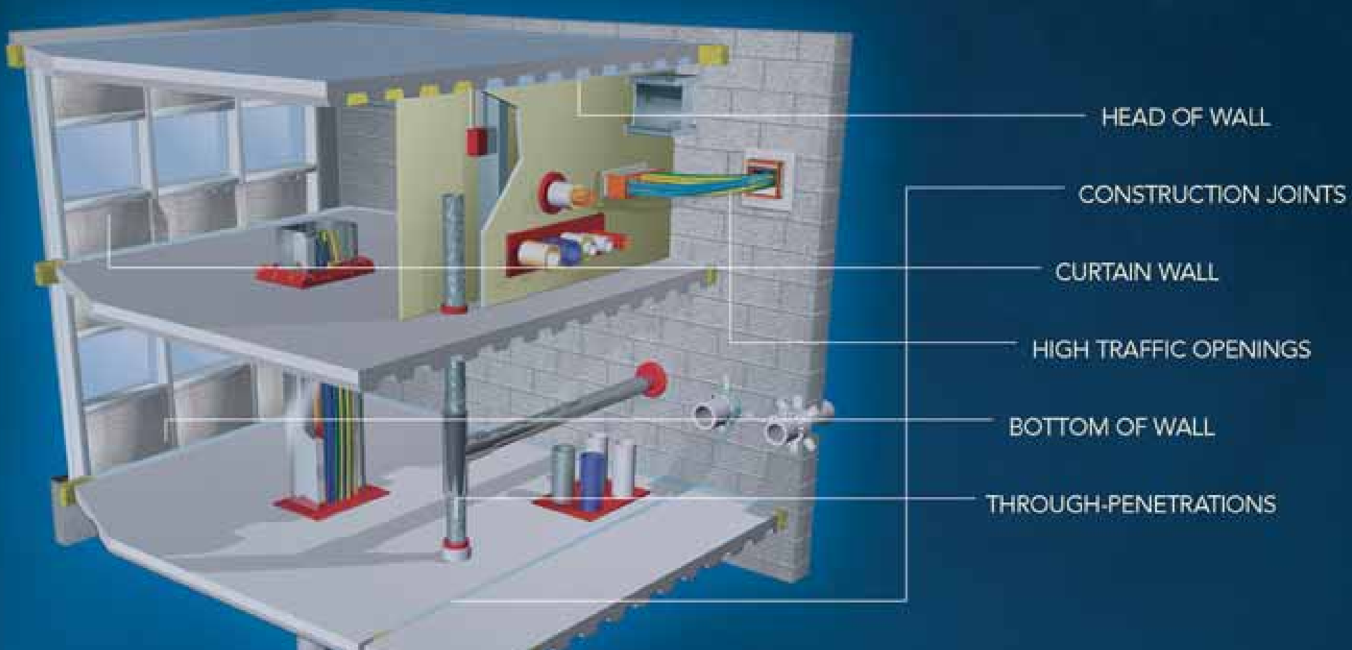

Meeting the Chall Protection

Pipes insulated with rubber foam insulation and sealed with Protecta FR Acrylic

Morten Iversen Berland

Polyseam

The built environment is at an interesting stage in development. Increasing pressure on space and ever increasing urban expansion mean that architects are building ever more complex and often increasingly large buildings, both for commercial and residential use.

Coupled with this increase in physical size, these building contain an every increasingly complex network of cables, pipes that are fundamental to the functioning of the 21st century business world. Sprinkler systems, fire alarms, smoke detectors and fire escapes are not only clearly visible to the building's users but are also well understood by everyone from the architect and the main contractor, to the guys actually working on the construction site. In contrast, other aspects of fire protection, in particular fire stopping methods such as seals and dampers, which are often unseen, do not seem to be understood or valued in quite the same way. It may also be that the physical presence of a sprinkler and alarms provides occupants with a certain level of comfort and reassurance that they are working or living in a safe environment.

Any building, however meticulous the design and construction, will always have an element of fire risk. However it must be better for everyone if a fire can be stopped or contained at the earliest opportunity rather than relying on full scale extinguishing systems and physical evacuations to ensure the safety of the building and its users. As research and development continues to push the boundaries of materials, in particular sealants and adhesives, the passive fire protection market is about to undergo some significant changes.

Education

At this point it is probably worth remembering the rationale behind fire stopping products. The idea is that buildings are broken down into fire resistant cells constructed from fire compartment walls and floors. Each of these must contain a fire for a set period of time and keep the fire from spreading out and into adjoining compartments containing important features like egress routes or expensive and/or vital equipment. If the wall or floor are penetrated by electrical, plumbing or mechanical items, or even doors or windows, these must be fitted in such a way as to maintain the original

enges of Fire

integrity of the cell. It is hard to believe just how quickly a room will fill with thick smoke through even the smallest of holes. Overall the consensus in the fire protection market is that there is a general lack of understanding, in the construction industry today, on how fire stopping is installed.

One country that has recognised the need for education in the area of passive fire protection is Norway. There is still no official requirement to train fire protection installers which means anyone can install these products. If installed correctly they can make a significant contribution to the protection of life and property; installed incorrectly and they become worthless and provide a false sense of security.

It is not only the installers that need educating, the wider construction industry shows a worrying level of ignorance when it comes to how, when and where these products can be used and are often ignorant of how their components of the fit out might impact on the fire stopping installer's tasks. Looking ahead the construction industry, regardless of the market in which it operates, needs to put installers of passive fire protection products and other trades on a level where all know their responsibility and how to contribute to keeping the building safe throughout its life. At the moment a technical group is working to provide the industry with a standard for the installation of passive fire protection which will open up the opportunity to include fire stopping in the official education system in Norway.

To fill part of the void Polyseam, with a third-party agent, has put in place basic certified education for the industry in Norway. On completion of the course the installer will be able to present evidence of their training when working on site. This course enables the installer to present evidence of his or her training when working on site.

Any building, however meticulous the design and construction, is sure to have an element of fire risk. However it must be better if a fire can be stopped or contained at the earliest opportunity rather than relying on full scale extinguishing systems and physical evacuations.

Future Products & Developments

Alongside a more professional approach to the installation of these products there is currently a significant level of research and development taking place across the industry. As materials technology advances, so further opportunities present themselves and manufacturers are responding to the demands of the market with innovative approaches. Among those currently under development are an alternative approach to protecting ventilation systems and the continued development of multi-purpose sealants, alongside further advances in acrylics and intumescent sealants that will be capable of meeting the standards required across a range of applications.

Other issues that have relevance to the passive fire protection market cannot be ignored and neither can they be viewed in isolation as one will often impact on another. This is particularly so with the continuous development of building materials and, as a consequence, developers and manufacturers of passive fire protection products need to keep up the pace and development in line and in conjunction with other arms of the building industry.

This need for a common approach has been recognised across Europe with the recent introduction of what is commonly known as CE marking. This legislation, which came into place at the start of July 2013, will help construction product manufacturers to market their products in a simplified and common European legislative framework using CE Marking to demonstrate reliability of the declared product performance.

An additional benefit of this legislation is that it will create a higher awareness among the industry with regards to other aspects in addition to fire resistance. This might include a product's reaction to fire, durability and other health, safety and environment issues like sound insulation qualities, thermal insulation rating and the content of harmful chemicals.

There is an undeniable trend across the entire global building industry where it seems that every-body" wants to build bigger and higher. There are regularly stories in the mainstream press about the latest ground-breaking or cloud-breaking sky scrapers that are gracing the skylines of many of the world's cities. Within these extraordinary buildings there is also a trend for increasingly large fire compartments, which is pressing the passive fire protection fit out to its limits.

A Truly Global Market

A recent report contains some startling statistics on the global fire stopping market. Since 2009 it has exhibited a ten percent growth rate, but what must be remembered that when both passive and active fire protection measures fail the results are fatal. Latest figures on the death toll attributed to fire accidents is approx. 12,000 in the USA, 7,000 in Europe and more than 50,000 in Asia every

Polyseam's test furnace in Norway

year. There are undoubtedly opportunities and these are being driven by a number of factors. These include:

- Insurance industry – containing a fire in a small sector of a building is far less expensive than the cost incurred as a result of a complete refurbishment or relocation. A business can probably keep functioning if one or two rooms are out of action but it is not so easy if your entire HQ has been fire damaged. In some countries, such as the USA adequate and certified fire safety measures can have a positive effect on a company's insurance premiums but this currently is not always the case in other regions. However in light of some of the recent disasters that have been witnessed around the globe, particularly in the clothing industry and in nightclubs, building safety, including passive fire protection, might find itself higher up the list of priorities for architects and developers in the future.
- There is an increasing trend to passive solutions and many believe that continuing technical innovations will help maintain this momentum. As already mentioned, many fire stopping solutions are concealed within the structure of the building, making them far more appealing to architects that are equally concerned not only with safety and construction of the building but also with its final use and aesthetic appeal.
- As countries like China, Brazil and India continue to expand their commercial activities, there is a growing demand from international organisations seeking premises in these countries to be sure that the buildings they are considering meet the most stringent of safety guidelines. New builds and retrofits are all helping to fuel this growing market. A similar story is true in many of the former eastern-bloc countries.
- Wherever a building is located, whatever its function and regardless of its age, its proprietors have a moral, if not a legal obligation, to consider the safety of all those working or living within its confines. There have been far too many recent cases from across the globe where a lack of suitable fire protection has led to the unnecessary loss of life. This cannot go on and ignorance is not a defence if the building you are responsible for succumbs to fire and lives are lost.

Building managers need to consider the robustness of their passive fire systems every time work is undertaken on the building. For example if the IT systems and phone systems are upgraded a wall that once had only one cable aperture may suddenly contain three or four extra points of exit. Will these have been fitted to the necessary standards, has a fire compartment been compromised?

Most passive fire systems contain a mixture of joint-based solutions and perimeter barrier elements. Ensuring their efficacy at the time when it matters starts at the earliest stage when specifiers and architects first start to think about the building. It must then be carried through to the main contractors, subcontractors and the product installers, each taking responsibility for their own stage, but at the same time understanding its impacts on the other elements of the building and recognising how the overall success is dependent on the correct interaction between each element.

If a window is broken, you repair the glass; if a lock is broken or the door is falling off its hinges you replace the lock and the hinge. Much like our own bodies, it is easy to see when the superficial elements of a building are changing or wearing out, but it is those unseen elements, like the arteries in our bodies or the passive fire protection systems in a building that need to be considered and cared for on a regular basis. Greying hair or peeling paint will not be a life or death situation, blocked arteries or a failed fire rated compartment within a high rise office block may be far more serious.

To conclude, the five Ps of passive fire protection are planning, performance, process, partnership and people. If building developers, architects, contractors, and managers keep these in mind then the passive fire protection market will soon start to make an even more considerable contribution to fire safety across the world. IFP

Morten Iversen Berland is a fire engineer at Polyseam AS

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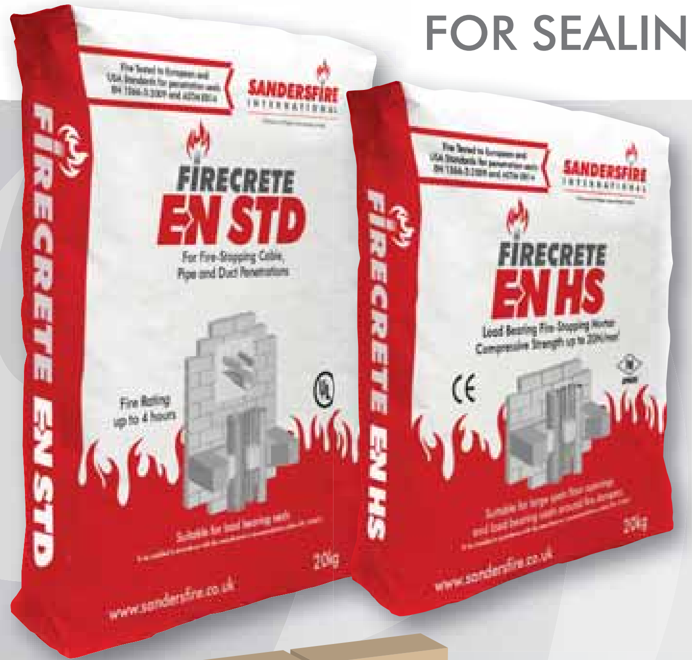

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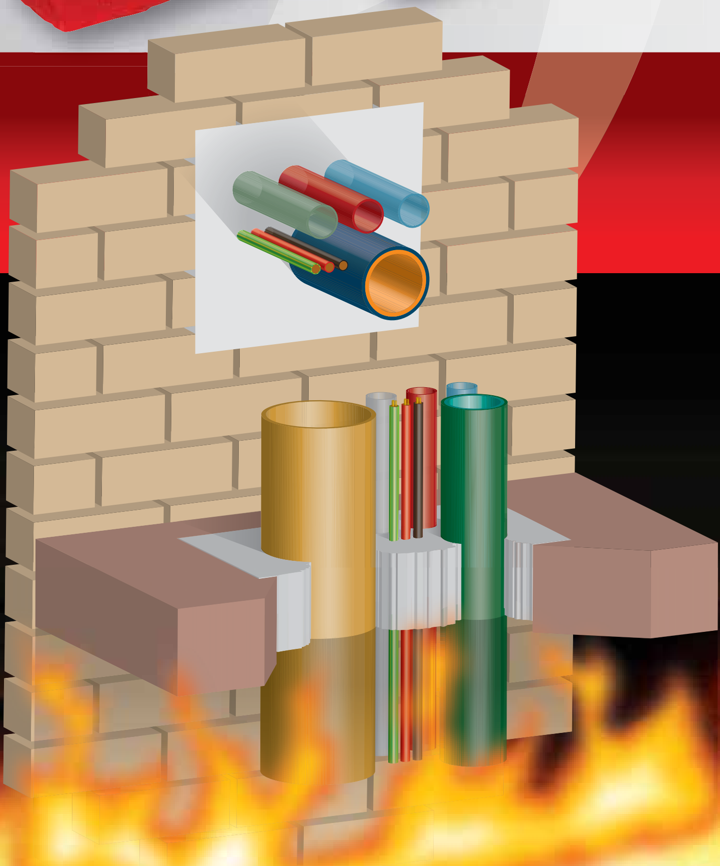

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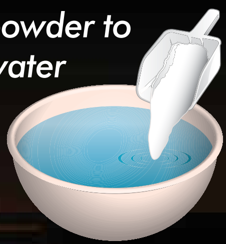
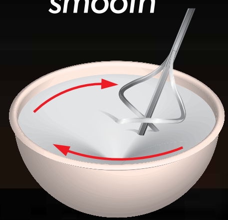
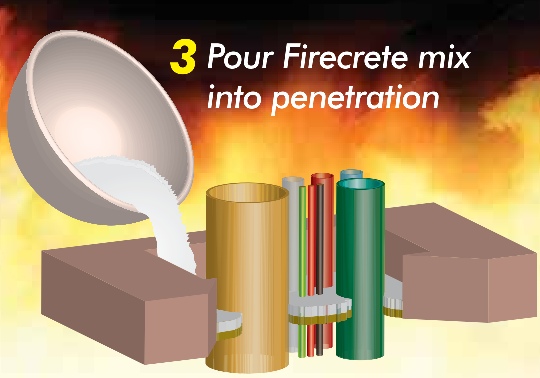


2 Mix until smooth



3 Pour Firecrete mix into penetration



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Emergency Lighting – Safe, Secure & Money Saving

Bernard Pratley

Industry Committee for Emergency Lighting

Modern emergency lighting is crucial for life safety in non-domestic buildings. But there are other benefits too.

In a building emergency, especially fire, fast panic-free evacuation can make the difference between life and death. This is why UK legislation demands reliable, good quality emergency lighting to ensure that people can see and that escape routes are properly identified and illuminated.

Today's high-quality technologically-rich emergency lighting products and systems allow building owners, specifers, installers, facilities managers and end users to meet fire safety legislation requirements, while simultaneously helping them to save money longer term. These latest systems also allow far greater design versatility than was previously possible. How is this achieved?

Use of LEDs

To take just one example, escape routes are often better served using LED emergency lighting products, because the better light quality and brightness produced allows greater distances between emergency luminaires. White LEDs produce bright, uniform light at high energy efficiency, with long life, good reliability and well directed light output. Unaffected by extremely low temperatures, they are nearly unbreakable. In addition, being highly compact, LED light sources allow the use of smaller luminaires, as they no longer have to accommodate relatively bulky fluorescent lamps.

LEDs can be clustered, or designed into buildings, structures and materials in ways that are impossible with conventional lighting, so they provide more freedom in the design of emergency lighting luminaires, which can be made to look sleek, modern and unobtrusive. This design flexibility helps particularly in public buildings, such as those containing doctors' and dentists' surgeries and swimming pools (as required by the new edition of BS 5266-1).

Because individual LEDs are almost a point light source, light control is simple, and the special optics allow virtually all the light emitted to be used, so compared with equivalent fluorescents,

good quality LED emergency luminaires often show energy savings of 30 percent or more. This translates into significant cost savings over the installation's life. In turn, the required battery capacities can be reduced, while supply systems can also be made more compact.

Because maintained emergency lighting is generally used in places of assembly, such as theatres, cinemas, clubs and halls, where the emergency luminaires are on at all times (though typically dimmed when these premises are occupied), this type tends to provide the highest level of building safety. However, maintenance costs are often higher than for a non-maintained installation because of lamp aging; fluorescent lamps in maintained emergency lights typically need replacing every eight months. However, LEDs, with their much longer lives under this mode of operation, will significantly reduce maintenance costs and disruption.

For Exit Signs Too

As another example, the latest exit signs are designed to be illuminated at all times, so are more conspicuous – yet at the same time, use the latest light sources available – that is, LEDs, which are highly energy efficient, so energy consumption is relatively small. Exit signs must also be sufficiently well lit to be clear even at maximum viewing distances, according to application standard EN1838. This defines the minimum luminance levels that signs must achieve. In this respect, LEDs are particularly effective in 'edge light' signs.

Central Emergency Lighting Power

There are essentially two main choices for emergency lighting systems. These are:

- Self-contained with an on-board battery in the luminaire.
- Luminaires that are slaves to a central emergency power system (CPS) in which the batteries are located away from the emergency luminaires. CPS and/or central battery systems are mainly used in medium or large installations where there are many emergency luminaires, or high ambient temperatures, as well as a need for central control.

In addition, there are two categories of CPS system, AC-DC or AC-AC. The former supplies a DC voltage (220, 110, 48 or 24V) to the slave luminaires, which have an inverter to drive the lamp. A slave fluorescent luminaire will provide up to 30 percent of light output in emergency depending on the voltage. On the other hand, 230V AC-AC systems (static inverter type) can supply standard mains high frequency luminaires (non-high pressure discharge), where the light output is not reduced in emergency.

A central emergency power system is regulated under the European Norm BS EN50171:2001, which classifies AC-AC systems into passive or active standby types. The former will have a momentary change-over to the battery-backed supply of no more than half a second; effectively, there is no supply break.

When choosing the optimum system for emergency lighting, it is important to establish whether the system truly complies with BS EN50171. This is best achieved if the system is registered under a third-party compliance scheme. The BSI Kitemark or equivalent authoritative mark, or accredited scheme provides that pedigree. The system should also be checked to see if it will provide a reliable power supply for the required duration to slave luminaires if a mains failure occurs.

Other aspects to be considered (which in any detail are outside the remit of this article) include whether an active or a passive system should be used, which can have an effect on duration, energy efficiency and component longevity, as well as battery size and function. Overload protection is considered essential.

Which is Best?

In initial investment cost, a CPS system is more expensive than self-contained emergency lighting, but greater emphasis should be placed upon energy conservation, system longevity, safety, future proofing and running costs over time – in other words, total cost of ownership – before making the final decision. Another aspect is that the latest LED lighting can be run from a properly matched CPS system, which gives specifiers a greater choice and flexibility in planning investments.

The most expensive CPS system components are the batteries, but modern sealed units last up to ten years, if properly managed by the charging/control regime. By comparison, the design life of batteries used in self-contained units is typically only four years. In addition, CPS batteries are held in a single location, whereas self-contained systems have as many battery locations as there are emergency luminaires, which incur high replacement costs.

Key Decision Considerations

The main emergency lighting aspects to consider include:

- The system and its technology must be suited to the building, its size and use.
- The lighting scheme must be safe and comply with the standard.
- Luminaires should be chosen for effectiveness, efficiency and aesthetics.
- Consider the significant cost benefits of energy saving.
- Try to 'future-proof' the system (e.g. parts availability and technological advance).
- Safe and easy maintenance is very important.
- Systems must be robust, even if an abnormal supply occurs.
- Ensure that the system can demonstrate product compliance with the appropriate standards.

Integrated Systems And Control

Integrated CPS systems combined with mains dimmed controlled luminaires is another technology that has evolved to provide still greater benefits for building owners and end-users. Such systems include the use of low-energy LED-based emergency lighting (either self-contained non-maintained, or with central battery systems) combining lighting controls and emergency functions into a single system. Such integrated systems, complemented by suitable connectors and accessories, can provide very high design flexibility. This helps save installation time, energy consumption and money, while allowing the creation of a very stylish, unified and yet distinctive architectural appearance.

Using Ethernet or industrial Ethernet communications networking, which can be linked to the higher enterprise level, if required, allows self-contained group battery systems and integrated central emergency lighting systems, to be controlled via a graphical user interface.

The latest emergency lighting controllers can be linked into building management systems (BMS) and even if complete mains failure occurs, recorded data – such as test logs – is stored in non-volatile memory. Moreover, in a large building, or group of buildings, a number of individual controllers can be used to provide high redundancy in the event of fire, which maximises safety at all times. Today, this is easily achieved using, for example, the DALI lighting protocol, which ensures simple and affordable integration into the building's general lighting system. ICEL member companies can provide guidance on such integrated systems.

Automatic Testing

There is little point in having an emergency lighting system (even if correctly installed) unless it is known that it will operate correctly when needed, so it is a requirement that testing be carried out on a regular, disciplined basis. All test results must be recorded and reported to the building's 'responsible person' and any repairs or remedial work identified must be carried out within a reasonable time.

Every luminaire should be tested, monthly and annually in accordance with EN 50172 – without putting people in the premises at risk if a mains failure occurs during the procedure. Any visible faults in the operation of maintained luminaires, exit signs and the charger indicator of central battery supply systems should be identified by users at least daily and rectified as soon as possible. All emergency lighting must be functionally tested, for at least five seconds at least every month, and tested for full rated duration of typically three hours at least every year.

Manual testing may need several experienced trained staff. In larger buildings this can be highly labour intensive, expensive and difficult to manage. Disruption may be significant and human error can occur, which could be serious for building occupants in an emergency because of failed emergency lighting resulting from undetected faults. Responsible persons found not to have carried out their duty of care could find themselves being prosecuted.

Anecdotal evidence suggests that a significant number of organisations and building owners are not sufficiently aware and/or disciplined about the way they test and maintain emergency lighting. So what can be done? Effective automatic testing reliably checks that the battery is connected and receiving charge, that the lamp will strike correctly when required and that the battery will run luminaires for the rated duration. There are two main types:

- **The Self-Test Emergency Luminaire**

The simplest is the 'stand-alone' form, which is not connected to any other device. The test status is typically indicated by a single bi-colour LED on luminaires. Anyone near an emergency luminaire indicating a fault can report this to the responsible person; corrective action must be carried out within a reasonable time. The person recording the data need not be electrically qualified.

- **Automatic Test Systems (ATS)**

To avoid manual recording, ATS interconnects to a control panel where the results are collected via data cabling or wirelessly. More complex systems allow test programming from the control panel, or through a PC, which visually shows luminaires under test and those showing faults. Some systems can be monitored and controlled via an intranet or Internet connection (or via Ethernet). Test result status can be monitored by the remote panel, but the monthly walk-round check is still necessary.

ATS can be more cost effective than manual testing. The capital investment is greater, but is offset by fewer testing devices needed and reduced labour, especially as the standard requires testing adjacent luminaires at least 24 hours between each set of tests. For manual testing, this doubles the site time needed for full duration testing, so ATS should be the better option. Such systems can be invaluable to maintenance engineers, and they also bring peace of mind that the system used has been certified by an accredited third party.

And Finally . . .

These modern emergency lighting technologies provide the many benefits mentioned, but additionally, there are now many more highly-trained specialist lighting engineers – a number of them from ICEL member companies – who are qualified to design the latest emergency lighting systems to meet today's application needs and be cost-effective for end-users. So there is every incentive to get your emergency lighting installation right first time. IFP

Bernard Pratley is Director at the Industry Committee for Emergency Lighting (ICEL)

For further information, go to www.icel.co.uk

Pic courtesy of Graham Collins

Tower Blocks: The Rising Issues

Neil Woods

Exova Warringtonfire

The recent inquests following the 2009 Lakanal House tower block fire in the UK have provoked intense debate, with crucial areas of concern over fire risk assessments for residential tower blocks, and calls for urgent action.

Inquests into the deaths of six people in a fire at Lakanal House in south London have raised important questions regarding the management of residential tower blocks by landlords and fire and rescue services. At the same time, it has highlighted the need to examine the scope of fire risk assessments. The Coroner found that five residents died of inhalation of smoke fumes, while the sixth died due to inhalation of smoke fumes and burns.

As a result, we have seen wide-ranging discussions among residential housing providers, the fire service, the fire safety profession and the Department for Communities and Local Government (DCLG) aimed at preventing another, similar disaster.

The Coroner's recommendations cover recurring issues around fire safety guidance, as well as the scope of fire risk assessment for high-rise residential buildings. These are crucial, complex issues that require clarity and direction to avoid another Lakanal House – and are intrinsically linked to the management and maintenance of residential tower housing stock.

Maintenance of Fire Compartmentation

It is critical that all residential buildings designed with a 'stay in place' policy provide the necessary level of fire resistance: 60 minutes between apartments and 60 minutes between apartments and common parts.

Typically, problems arise at two stages. First, at the new build stage, where deficiencies such as inadequate fire stopping slip though the sign-off process; and second when the building is in use and the integrity of the previously installed compartmentation is compromised by refurbishment programmes, other alterations to the layout and building service maintenance and installation.

The fire risk assessment required by the Regulatory Reform (Fire Safety) Order 2005 (FSO) is only one part of the range of measures required to ensure that residential buildings have sufficient compartmentation. While the FSO fire risk assessment will identify some compartmentation failings, it is important to understand the limitations of such an assessment and that not all compartmentation failings can be identified by a non-invasive survey of common parts of a building in keeping with FSO requirements. Just as crucial, the fire risk assessment is only a snapshot in time. The fact that on the day of its completion no deficiencies in fire compartmentation were identified does not mean that at some later stage new deficiencies will not emerge.

It is particularly important that building owners and landlords have robust policies in place to manage building works and ensure that the integrity of the fire compartmentation is not breached. Procedures should include scoping of works to evaluate how the fire safety precautions will be affected and how the precautions will be maintained post-completion of the works. Where necessary, the works package should specifically address the reinstatement of the compartmentation when the project is complete.

Crucial Steps to Prevent Degrading of Precautions

It is particularly important that building owners and landlords have robust policies in place to manage building works and ensure that the integrity of the fire compartmentation is not breached. Procedures should include scoping of works to evaluate how the fire safety precautions will be affected and how the precautions will be maintained post-completion of the works. Where necessary, the works package should specifically address the reinstatement of the compartmentation when the project is complete.

Contracts used by landlords also need to stipulate that only competent third-party accredited contractors are used for fire-stopping works, and that there is a sign-off process to make certain that the integrity of the compartmentation has been maintained. Too many refurbishment contracts rely on non-specialist building trades maintaining or reinstating fire-stopping and compartmentation systems.

It is also important to note that the fire risk assessment process is dynamic by nature and any changes to a building or concerns over fire precautions should trigger a full review of the fire risk assessment.

These contract management issues are addressed by PAS 7: 2013 – Fire Risk Management Systems, which recognises that effective fire safety management extends well beyond undertaking a fire risk assessment. While the PAS 7 document is a welcome addition and provides a good blueprint for organisations to manage fire safety effectively, unless this is embraced by the regulatory authorities as best practice approach the pace of change will be very slow. However, the PAS 7 template model, if widely adopted, will do much to prevent a gradual deterioration of fire precautions, especially compartmentation.

The Limited Scope of Fire Risk Assessment

The FSO requires that a 'suitable and sufficient' risk assessment be undertaken for high-rise residential buildings. Crucially, the FSO does not strictly apply to private residential property. Based on the initial fire risk assessment requirement and the exclusion of private residences, if the FSO is followed to the letter, it is clear that a fire risk assessment will be restricted to the 'common parts' of a residential tower building.

There is suggestion from Lakanal House and elsewhere that a risk assessment compiled strictly in accordance with current FSO guidance, and in isolation to other compartmentation survey work, may be insufficient to identify all the issues relating to construction materials and methods of installation. This also may result in problems with surface spread of flame and lack of appropriate fire resistance to support a 'stay in place' strategy around which such buildings have been designed.

Issues surrounding the lack of compartmentation and deficient fire-stopping are commonplace in these types of buildings. Problems often relate to deficiencies in connection with service risers and drains passing through the footprint of apartments, compartmentation between apartments and communal areas, compartmentation to stairs and corridors (means of escape) and compartmentation to refuse chutes. This is by no means an exhaustive list but does illustrate some of the most commonly encountered problems.

Clearly, some of these issues are difficult to identify as part of a fire risk assessment not involving intrusive works in communal areas – a situation that is exacerbated by risk assessments that do not include an inspection of the apartments. Also, as we have seen, the FSO does not require a fire risk assessment to encompass the inside of apartments. All of which begs the question: What should be the scope of a fire risk assessment for a high rise residential building?

A Key Question for Fire Risk Assessors

If fire risk assessors asked themselves the question: If I undertook a fire risk assessment following the FSO guidance (that is, not invasive in communal areas and not involving access to the inside of apartments) would I be able to identify all fire compartmentation failings and surface spread of flame failings? The answer would be a unanimous and resounding No.

If this assertion is accepted, there is clearly something very wrong with the legislative framework governing the undertaking of fire risk assessments of residential properties, or the supporting guidance, or both.

What Constitutes the Common Parts of a Building?

Clarity is urgently needed on what constitutes common parts of a building. Neither the FSO nor the supporting DCLG guidance – Fire Safety Risk Assessment – Sleeping Accommodation, is clear on this critical question.

On the face of it, the term seems easily understandable, but on closer scrutiny questions start to arise. For example, is a service riser through apartments a common part? Is the front door of an apartment a common part? Following current guidance to the letter it could be demonstrated that the riser through apartments is not a common part and that the front door to an apartment is, but both are important and relevant aspects of the fire resistance performance of the structure.

These questions can potentially affect the safety of the occupants in a residential building and should therefore form part of any fire risk assessment if they cannot be resolved by the landlord's management systems and supporting information. Unless a robust body of evidence is available, then doubts will remain if any balanced risk-based approach is adopted.

Shortcomings of the Local Government Group Publication

The Local Government Group (LGG) issued guidance in regard to purpose-built tower blocks in July 2011 in an attempt to clarify the risk assessment approach that should be followed in purpose-built residential buildings.

This document – entitled '*Fire safety in purpose-built blocks of flats (apartments)'* – goes some way to eliminating a number of misconceptions regarding fire risk assessments. However, it offers little assurance that serious latent defects will be identified and tragedies similar to Lakanal House prevented.

Section 34.1 covers the scope of a fire risk assessment and categorically states 'the flats (apartments) themselves are outside the scope of the fire risk assessment and therefore the FSO' reiterating the FSO restriction to the scope of a fire risk assessment. But the second part of 34.1 says it will normally be necessary to gain entry to at least a sample of apartments to examine the fire safety measures to ensure that, if a fire occurs in an apartment, there is no undue risk to other residents – a statement with which it is difficult to disagree.

This second part of the guidance seems to

Pic courtesy of Graham Collins

contradict the first part and introduces the concept that it is necessary to inspect the inside of apartments for a risk assessment to be "suitable and sufficient". This contradiction only adds to the confusion as to what the scope of a fire risk assessment should be.

At Exova Warringtonfire, we believe many of these problems can be avoided by the adoption of cohesive and focused management of contract works, where the contract itself makes specific reference to the maintenance of fire precautions. This is clearly a building work issue of critical importance to the management of buildings. We also believe the role of the fire risk assessment in identifying failings with the building fabric, or with processes for managing contract works – or indeed the lack of records – is highly relevant because many buildings clearly do contain latent defects. The assessment process and the programme for managing contract works should complement each other to achieve a robust fire safety management regime.

Lessons to be Learned

There are certainly a large number of residential tower buildings in the 30 to 40-year-old bracket where the physical fire precautions are not in keeping with supporting a 'stay in place' policy and where in many cases, the risk assessment has not given sufficient recognition to the potential latent defects that may exist.

Any professional fire risk assessor will, I am sure, testify to this point and know of numerous examples. A non-invasive fire risk assessment of common parts alone is not sufficient to identify failings because, as we have established, these may only become apparent after gaining entry to a sample of apartments – and in some cases after invasive survey work in the apartments.

So in order for a landlord – the 'responsible person' under the FSO – to establish that adequate 'general fire precautions' have been maintained, how would compliance be demonstrated? It is necessary to have undertaken suitable and sufficient risk assessments of the common parts of the building, as an absolute minimum.

Based on all the information available, if this assessment is supported by appropriate fire safety management information, and subject to there being no other adverse factors leading the risk assessor to suspect failings may exist, this approach may be reasonable. However, where the necessary body of evidence does not exist or it is not clear, it will always be necessary for the risk assessment to recommend further investigations be undertaken.

Third Party Specialist Assessments are Essential

For a 'responsible person' to be able to demonstrate that failings in the fire compartmentation do not exist, fire safety professionals believe some form of third-party information or evidence should be obtained. Without a third-party review, reliance is placed on contractor documentation (often issued through self-certification schemes) that the works will maintain the required degree of fire compartmentation. Moreover, a third-party inspection for building control sign-off would add robustness and allow the responsible person to challenge enforcement action taken under the FSO.

Where comprehensive fire safety management information does not exist, it is clearly the duty of the responsible person to either undertake more invasive and extensive fire risk assessments and/or a separate compartmentation survey.

A fire risk assessor in this situation should, as a matter of course, emphasise the issue as a significant finding and make a strong recommendation to establish the position of the compartmentation, along with what – if any – remedial work is required. The requirement in the FSO to undertake a "suitable and sufficient" risk assessment is undermined by it not being applied to private residential premises. Although other articles of the FSO – such as Article 8 on Duty to Take General Fire Precautions – do impose general duties regarding fire compartmentation, the requirements are ambiguous and do not offer sufficient direction to create a firm understanding of landlords' responsibilities. In fact, the current – some would say disjointed – approach to the guidance approach creates problems in itself.

The Benefits of a Cohesive Strategy

A more joined-up approach between Approved Document B to the Building Regulations, the FSO and the LGG guidance would represent a giant leap forward, creating a much clearer risk management regime that landlords/responsible persons would be able to understand and implement across their property portfolio.

This would help all stakeholders to take ownership of and to develop a proactive approach to improve the guidance available and ensure there is a strong message sent out to responsible persons. The proposed approach would also provide the regulatory authorities – primarily the fire and rescue service in the case of the FSO – with a much cleaner framework to police.

The issues emerging out of the Lakanal House case have rightly put the topic of managing fire precautions in high-rise residential buildings under the microscope, while focusing the minds of landlords and property owners. It also needs the commitment and will of senior decision-makers in the regulatory authorities to step in and take action to ensure this can never happen again. IFP

Neil Woods is Risk Assessment Manager for Exova Warringtonfire

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DX1080	Nonionic	●	●	●	●
DX1090	Nonionic	●	●	●	●
DX1025*	Anionic	●	●	–	–
DX1026*	Anionic	●	●	●	●
Foam Stabilizers					
DX5011	Anionic	–	●	–	●
DX5022	Anionic	–	●	–	●
DX5065**	Anionic	–	●	–	–
DX5066**	Anionic	–	●	–	●

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What Do Recent ICAO Fire Test Changes Mean For Airports?

Mike Willson

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Proposed changes to ICAO (International Civil Aviation Organisation) Level A, B and new Level C fire tests have now been ratified, and will be implemented in November 2013. But what does this really mean for Airport operators and firefighters? Will it perhaps increase fire safety and reduce risks by gaining control faster with less foam used from the first attack vehicle and reduce risk of fuel pick-up and sudden flashbacks? Will it meet a key objective of requiring smaller trucks, fewer crew and thereby create efficiency savings and reduced operating costs, or could it potentially erode safety margins and dilute performance standards? Perhaps some complex mixture, so let us investigate in more detail to try and better understand the likely outcomes.

For most fires the objective is clear, to extinguish the fire before safe rescue commences.

The ICAO Airport Services Manual Pt.1 (Doc 9137) confirms that the main operational firefighting objective for aviation is to control any fire occurring, but not necessarily extinguish before rescuing survivors can begin. Unwarranted delays or potential risk to survivors may result from extinguishing all flame before rescue begins. Accordingly ICAO defines a Theoretical Critical Fire Area (TCA) as the length of the aircraft fuselage plus an extension of area based on upwind and downwind potential involvement, related to aircraft size.

In practice seldom is this entire TCA on fire, so firefighting efforts are focussed on a smaller target closer to the fuselage and exits, called the Practical Critical Fire Area (PCA), typically around 66 percent of TCA, based on analysis from actual aircraft accidents over time.

How Does the US Mil-F Spec Compare?

US airports use Federal Aviation Administration regulations requiring compliance with the US Mil F24385F specification (Mil spec.) where some lower test application rates are required, compared to ICAO Level B, but similar to this new Level C, as shown in the Table on page 58.

Hence the sensible exploration of whether

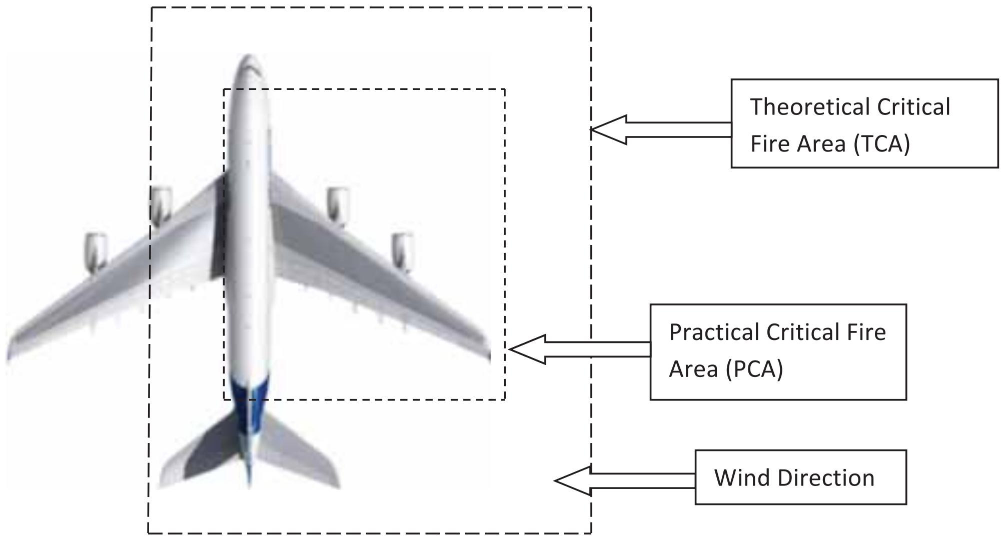

Diagram of Theoretical and Practical Critical Fire Areas, relative to a large fixed wing aircraft

Comparison of 3% foam requirements for Mil spec. against the new ICAO Level C fire test.

Criterion	US Mil F 24385F spec. (3%)	ICAO Level C (3%)
Fire tray shape and area	Circular 28ft^2 (2.6m^2) and Circular 50ft^2* (4.64m^2)	Circular 7.32m^2
Fuel type	Unleaded gasoline	Avtur Jet A
Fuel quantity	10 galls (37.85L, over water base – not specified) 28ft^2 15 galls (56.77L) on 50ft^2	157L fuel (over 157L water base)
Foam nozzle & flow rate	Mil spec 2 gall/min (7.5L/min)	UNI86, 11.4L/min
Nozzle pressure	100psi (7 bar)	6.3-6.6 bar
Application density	0.07g/ft^2 (2.92L/min/m^2) 28ft^2 0.04g/ft^2 (1.64L/min/m^2) 50ft^2‡	1.56L/min/m^2
Foam solution temperature	23°C ±5°C	≥15°C
Nozzle movement	Complete freedom of movement	Fixed position
AFFF foam %	3%, 1.5% (lean)†, 15% (rich)*†	3%
Fire pre-burn	10 secs	60 secs
Water quality mixed with foam	Fresh & Sea	Fresh only
Foam application time	90 secs	120 secs
Extinction time (pass)	30 secs (3%), 45 secs (1.5%), 55 secs (15%); 50 sec on 50ft^2	60 secs with flickers
Totally extinguished (pass)	30 secs (3%), 45 secs (1.5%) 55 secs (15%), 50 secs 50ft^2	120 secs (no flickers)
Burnback pot location	0.3m dia, 50mm tall, 1 gall ULG (3.785L) Centre tray	0.3m dia, 200mm tall, 2L ULG/JetA Centre tray
Burnback pot ignition	60 secs after end foam application	120 secs after end foam application
Burnback re-involvement (pass)	≤25% tray area in 6 mins (3%), 5 mins (1.5%), 3.3 mins (15%) ≤25% tray area in 6 mins (50ft^2)	≤25% tray area in 5 mins
Film formation & sealability test	✔	NR
Physical property requirements	✔	NR
Compatibility with all other QPL listed products test	✔	NR
Compatibility with Dry Chemical test	≥6 mins burnback	NR
4 metals corrosion test	Specific rates allowed	NR
Fluorine content	Measured	NR
Halides (salt) content	≤500ppm	NR
Aquatic toxicity test	LC50 ≥500mg/L	NR
Biodegradeability, BOD/COD	20 day Biodeg. 65%,COD ≤1,000k mg/L	NR
Compliant container spec.	✔	NR
Qualification on Products List (QPL) as acceptable for use	✔	NR
Strict label requirements	✔	NR

Key: * = seawater test only; †= 28ft^2 test only; = Easier; = Harder; NR = Not Required; ‡ = same as UL162 fire test.

equivalent foam efficiency savings are possible under ICAO regulations with the development of this Level C specification.

The comparison above shows some clear differences, which make it hard to directly compare. However an assessment has been made of sections of each test, to determine which is generally likely to be harder or easier to pass (focussed on the 50ft^2 Mil spec test). While unleaded gasoline is not directly used to fuel modern jet aircraft, any foam working effectively on this volatile fuel is likely to handle kerosene products like Avtur. The very short ten-second pre-burn period under Mil Spec. means the fuel and tray edge have little

chance to get really hot and potentially cause difficulty sealing round the tray edge. The USA's Hughes Associates assessed the shorter 50-second extinguish time as producing a lower 50ft^2 "extinguishment application density"(EAD) of 1.36L/m^2. The 60-second pre-burn time for kerosene does permit the metal tray edge to get hot, and potentially makes it harder for foams to seal around the tray perimeter, and the fixed position nozzle also makes it very tough. The new allowance of flickers at the intended extinction time of 60 seconds weakens this impact, evident from an EAD, assuming a 75-second extinguish time (Level C), extending to 1.95L/m^2, possibly more.

The inclusion of seawater (required for naval operations) on the 50ft^2 fire undoubtedly makes any fire test more challenging, particularly when the summation of percentage extinguish areas at four stages during the 50ft^2 fire must also meet specific criteria. Certainly undergoing half strength, over-rich and mixture of agent fire tests, adds a level of difficulty and consistency requirement that exceeds the new ICAO Level C requirements.

Extra metal corrosion, dry chemical compatibility and environmental performance requirements add complexity and difficulty to achieving a Qualified Product Listing (QPL) under Mil spec. In discussion with a fire testing professional, it appears they are probably generally of similar difficulty. If the Level C required extinction in 60 seconds this may be the harder test, but with edge flickers permitted to 120 seconds the US Mil spec is probably marginally harder for a foam concentrate to pass, even though the actual fire tray area is smaller, pre-burn significantly shorter and full nozzle movement available.

Modern preferences for indoor testing deliver greater consistency, but it also insulates the fire from natural wind effects, so ironically conducting the Level C test outdoors may enable more products to meet the original 60-second extinguish criteria. This could also help explain why the large scale outdoor tests were extinguished around 40 percent faster. Some readers may disagree, but this is probably the best impartial assessment we can make, without conducting independent side by side indoor fire testing.

New ICAO Level C Protocol

Such a high performance focus could increase speed and likelihood of passenger and crew being safely rescued from the plane, even though flames may still be active outside the PCA. The target was to achieve 25 percent to 30 percent less foam agent on fire vehicles, so instead of using the current 5L/min/m^2 foam application density commonly used by Aircraft Rescue and Fire Fighting (ARFF) Services across much of Europe, Middle East, Africa and Asia, the possibility of 3.5L/min/m^2 (still over double the fire test), could be achieved, with associated operational savings being available.

Achieving Level C was always likely to require a three-fold increase in fluorotelomer surfactant levels (a key ingredient in AFFF foams) according to one manufacturer, indicating just how tough it is to pass this new Level C test. However it confers more reliable resistance to fuel pick-up, less risk of sudden flashbacks and re-involvement, which could put firefighter safety at risk when they are not present.

Acceptance of fluorotelomer surfactant foams in this test perhaps also underlines how much closer the environmental performance of C6 fluorotelomer surfactant-based foams are to fluorine-free foams, and very different from PFOS now banned from use across the European Union, and PFOAs over which concerns continue. C6 fluorotelomer surfactant-based foams cannot degrade to PFOS or PFOA and are proven effectively non-toxic and non-bioaccumulative.

As aircraft get larger, so does this PCA, requiring more fire trucks and personnel to attend an incident using Level B approved foam concentrates. Adding this new Level C could potentially reduce required foam quantities, particularly when 3% concentrates are used, along with associated reduced water demands, possibly less equipment, less run-off, potentially smaller fire trucks, with fewer crew for rapid first intervention at a future large "super-jumbo" aircraft incident, which could help save more lives.

In an effort to achieve such increased firefighting efficiencies an extensive range of fire tests was conducted at the CNPP (Centre National de Prevention et Protection) test facility in France. 28 samples were submitted from eight manufacturers. Only one of those concentrates was reported to have met the extinguishment requirement of 60 seconds, while several extinguished within 120 seconds. Around a 500m^2 fire test replicating a large aircraft, PCA was also conducted on a product at Level C application densities, which seemingly extinguished significantly faster at the larger scale. This provided confidence about safety at a practical ARFF level, and supported the capability of adequate control with fewer vehicles responding.

Consequently the Level C test is recently formalised delivering 38 percent lower application densities (1.56L/min/m^2) over the more familiar Level B (2.5L/min/m^2). It still uses a circular tray with a 63 percent larger fire area of 7.32m^2, requiring 157 litres of Avtur Jet A fuel (Kerosene). Foam application from a pre-mix vessel uses the current UNI86 foam branch-pipe delivering 11.4L/min, but maintains a fixed position one-metre above the upper edge of the fire tray and at a distance that ensures the foam falls into the centre of the tray, avoiding variations in operator technique. Already we see at least two products with ICAO level C certification, maybe we will see Mil F QPL products also meeting Level C certification in future.

Interestingly at each of the three performance levels the ICAO standard now defines: "a foam concentrate is acceptable:

- If the time to extinguish the fire from the overall surface of the tray is equal or less than 60 seconds and;
- The re-ignition of 25 percent of the tray surface is equal or longer than five minutes.
- Yet a critical extra note has been added: "Note for testing Authorities: At the 60 seconds time, minute flames (flickers) visible between the foam blanket and the inner edge of the tray are acceptable:
- If they don't spread in a cumulative length exceeding 25% of the circumference of the inner edge of the tray and:
- They are totally extinguished during the second minute of foam application."

So hang on, it is not extinguished until it is totally extinguished, which is different from extinguished, yet surprisingly nowhere in the document are these changed meanings clarified. The Oxford English Dictionary defines extinguish as *"cause a fire or light to cease to burn or shine; put an end to; destroy; or render void"*, so why this change?

Extinguish in ICAO parlance now seems to mean "not extinguished" to the lay person, as it includes small flames or flickers and only "totally extinguished" means no flames (that is, extinguished). This is an unfortunate anomaly probably linked to critical fire area concepts, but could have adverse impacts, particularly at Level B in future.

Exposure Risk Increases at Level B?

In view of this PCA concept, it is perhaps the use of fluorinated surfactants over many years that has helped to ensure effective fire control while minimising the risk of escalation and sudden flashbacks that may otherwise occur during aircraft incidents from fuel still flaming at the margins. It is therefore re-assuring that any newly approved Level C foam concentrates may require higher levels of fluorocarbon surfactants than current Level B approved concentrates, which may be fluorine free.

ARFF response times have historically been based on the survivable atmosphere inside the fuselage during an external fuel fire being three minutes, assuming no fractures. Specialists confirm fire also takes three minutes to burn through an undamaged fuselage, so rapid fire control to rescue survivors is critical. Until recently NFPA 403 required a response time of two minutes, allowing a further 60 seconds to apply foam and control the fire, before survivors could become asphyxiated, suffer potential burn through, or both.

This underlines the historical importance of the 60 seconds or less extinguishment requirements under both ICAO and Mil spec. However we now see dilution at Levels A, B and C with extinction extended to 120 seconds. NFPA 403 response times slide out to three minutes, so likely fire control times may increase, likely foam quality may decrease with relaxing ICAO level B test criteria, which would seem to be eroding safety margins for any survivors and emergency responders. Is that acceptable?

Exposure to extra risk comes with forceful application of F3 foams, for without fluorinated surfactants more detergent is required to achieve adequate performance. This attracts more fuel pick-up into the forcefully applied F3 foam blanket. As the bubbles begin to collapse, fuel vapour is released at the surface which can lead to sudden flashbacks and re-ignition from incandescent materials, or a still flaming area outside the PCA. Casualties or firefighters could be exposed to adverse impacts during rescue operations, increasing their level of risk. Similarly, allowing persistent edge flickers up to 120 seconds, will inevitably allow previously unacceptable and inferior AFFF foams to pass this diluted Level B test, potentially reducing safety for everyone.

Perhaps upgrading to C6 Level C products, where less foam and water resources are being used for a given sized incident, or C6 Mil F approved products, where post fire security and minimal fuel pick up are assured, would help to redress this balance.

Conclusions

Perhaps we are seeing a polarisation within ICAO. A new high performance Level C fire test that seems only achievable with more fluorochemical ingredients, yet potentially delivers significant operational savings with less foam and water on wheels, requiring smaller fire trucks with potentially fewer crew. Yet we also see a "dumbing down" of Level B performance with edge flickers now being allowed up to 120 seconds, inevitably resulting in previously unacceptable products now becoming accepted. NFPA 403 lengthening response times adds to this general eroding effect. Tough decisions ahead face airport operators, a few having already gone down an F3 path at Level B. Is that wise when C6 fluorotelomer surfactant-based foams and F3 products are more comparable than ever environmentally, and Level C would seem to deliver advantages in terms of potentially improved fire safety, and cost efficiency. Are we really focussed on improving life safety, or is it all about economics? IFP

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Fire Bells or Voice Way to Go?

Full-scale training at the Etihad Stadium in Manchester

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It is a fact that the typical person is slow to respond to a traditional sounder, such as a bell, warbler or klaxon – this has been proven. Many people will have put themselves in danger at some time during their life by ignoring this type of sounder. Voice alarms were developed as the solution to this problem, to provide clear spoken instructions in order to evacuate a building as quickly as possible and without panic. However, is voice alarm always the answer, when should such a system be considered?

There are no direct rules or guidelines as to when or whether a voice alarm system should be installed. However, it is the responsibility of owners, managers or operators of a business to ensure that adequate means are provided for protection and escape to safety. This comprises an effective method of detecting and giving warning of a fire, which can be anything from the simplest solution to a comprehensive one with a networked voice alarm system.

There are many advantages of a voice alarm when compared with alternative systems – it is not only a means to initiate an evacuation. For instance, it can be used for live speech as well as recorded messages, it is a zoned public address system, can broadcast timed announcements, provide ambient background music and more.

Another facility is the ability to broadcast a coded message or advance 'silent' indicator, which is used to make key staff aware up to three minutes prior to a full evacuation instruction. This is the 'first knock' ability that is liked by management (and the fire services) as it can prevent a full scale evacuation when the alarm is either a false one or is a minor incident that can be dealt with without consequence.

When asked about voice alarms, a fire officer with over 30 years' experience and now working independently as a consultant, said: "It is an enhancement, complementary to requirement. It is a tool to assist the appointed responsible person to buy time in an emergency." He further commented "A voice alarm is ideal for use in large or complex buildings, but it is essential that the building is always managed by people that are aware of the system's capabilities. It can assist with phased/managed evacuation and is good for places of assembly such as stadia."

"Ask yourself at day one", he said when talking about new builds, "What do you want? What tools do you need to provide adequate protection and evacuation? Answer the 'what if?' questions before it is too late."

Asked about voice alarms, Nigel Cusack, Group Manager, East Sussex Fire & Rescue Service, responded: "It is necessary to overcome inherent

Alarm . . . Which

human behaviour. Some members of the public ignore repetitive fire sounders if consistently linked to a false alarm. VA allows greater control in large complex buildings, particularly where phased evacuation is used." Particularly liked by George O'Reilly, Business Support Manager, East Sussex Fire & Rescue Service, is a touch screen control panel, which he points out can: "Give a clear indication of the situation within a building, as well as allowing rapid communication to risk-critical areas for the duration of an incident, to both building managers and responding emergency services".

A building engineer in Central London stated that: "Voice alarm is mainly used in our properties for evacuation, using automatic messages. We do not use the microphones unless authorised by a fire officer in a real incident. It works very well for evacuation of large properties, and occupiers and visitors respond very well."

"Voice alarm systems are there to protect personnel – people – lives." said Bob Howard, Managing Director of Electrical & Acoustic Services. "It is most beneficial for members of the public who are unfamiliar with surroundings; and provide improved safety when operated by trained staff who will direct operations with explicit instructions."

In a fire it is a well-known fact that every second counts and that it is important to provide maximum time for response and escape. What is best for one building will not be good for another. An example is where the owner of a bicycle shop ascertained that he could see all areas of his premises from any point and his 'call to alarm' was a whistle hanging on a rope; basic, but adequate. A building's risk assessment should always highlight any shortfalls and so a good management strategy is key.

There are no British Standards or direct guidance that state a voice alarm should be used, although BS9999 does guide towards this type of system, depending upon the evacuation plan for the property. We asked when it is generally considered that a voice alarm should be installed. A suggestion is that it should definitely be considered in more complex buildings and in buildings where phased evacuations are employed.

Budget is obviously a consideration; nobody wants to spend more than they feel necessary and voice alarm may well be dismissed because of this. However, at the design and build stage, to add a VA system is more cost effective and businesses can adapt them to add value, such as music or broadcasting advertisements.

There is a 'half-way' house option between traditional bell sounders and voice alarm – these are voice sounders. This type of system has the advantage of being lower in cost than a voice alarm system and can provide more information than a bell sounder during an emergency. A voice sounder system can be considered suitable for small rooms with low background noise such as a

A Baldwin Boxall voice alarm system is installed in The Shard – the tallest building in the European Union

small office or hotel room. There are obviously limitations; it cannot be used for live speech, or to broadcast non-emergency information, also, there are SPL (Sound Pressure Level) limitations, restricted power and no EQ ability.

There are possible problems with reverberation/ 'spill over' from one area to another that could create some confusion. Staff training should be involved, however, and be available to instruct and guide. Some have 'visual indicator' systems incorporated that are beneficial.

On the subject of company budgets, Neil Jarvis, Sales Director, Baldwin Boxall, said: "Cost these days is crucial for many companies. However, if a building has a need for a public address system as well as a fire alarm system – it does make economic sense to combine the two and install voice alarm. This would also make significant savings with regard to cabling when installing the one system."

Phased evacuation is an important factor for many buildings and is achievable by the three

A typical touch screen control screen

systems (bell sounder, voice sounder and voice alarm). The most basic form being the bell sounder that can issue a full or intermittent signal accordingly. These will be dependent on the fire alarm zones likely to be affected by a fire situation. A voice sounder system can also be used effectively for phased evacuation; there are message limitations but, properly planned, this might be a solution for some buildings.

A voice alarm system will provide a fully programmable, phased evacuation solution as, in an emergency, only a voice alarm system can effectively direct all building occupants through an alert/evacuation procedure. Voice alarm facilities have become standard fitment in many large commercial buildings and people do respond immediately when instructed.

A building with phased evacuation must be a 'managed site', and the building must have the structure to support it. For instance, stairwells need to be fire protected. Phased evacuation provides valuable time for the people at greater risk of harm by slowing down those who may not, in the first instance, be seriously affected by the fire. Buildings over five storeys normally have phased evacuation and for this to work effectively, you need both public address and bell sounders – double the wiring and equipment – or install voice alarm at the outset.

Out of the three systems, a terrorist threat may well be where a voice alarm system provides the advantage. Simply sounding the fire alarm can have disastrous consequences by moving people into danger instead of away from it. Indeed, voice is vital in terror threats as it is difficult to contain areas without this type of system, especially if it is a "dirty" bomb. Maybe in a high rise you would want staff to stay away from windows or evacuate via an exit away from the danger area. Bell sounders could hinder and evacuate people into a danger area

In a terrorist threat a public address system could be used to broadcast a live message – as long as the operator is competent, the instruction is intelligible and the system can be heard by those that need the information (particularly if a bell sounder is also operating). However, a public address system is not intended for use in an emergency – it is not monitored for faults or battery-backed – and could not, therefore, be relied upon to function when critical.

It is imperative that everyone in the building can hear an alarm or evacuation signal. If the system transmits a voice message, occupants should be able to understand the message. However, audibility does not guarantee intelligibility – just because an occupant can hear a voice, it does not mean that he or she can understand what is being said. Quality and design of the loudspeaker system, acoustics and surroundings are all part of this, and so is language.

In public places there can be a cultural mix of people and, therefore, differing native languages. Would the bell sounder be as effective in these areas, does the language make a difference? A bell sounder system is not reliant in any way upon language – it is an alarm sound that is probably recognised by all as a form of alarm indication but not which particular type – is it a fire alarm, a security warning or, staff alert?

However, if the spoken language is appropriate for the location, many should understand and be able to react immediately to the instruction given – thereby leading others to follow (or at least question the activity). Of course, with a voice alarm system it is possible, and not unreasonable, to rotate more than one language. With voice alarm, an attention drawing signal (ding-dong chime) precedes any announcement to attract people's attention to the following voice instruction." (The attention drawing signal can also be a siren, or similar, in the case of emergency messages.)

With any system, false alarms can be an issue, causing real events (terrifyingly) to be ignored. System design and measures can be taken to limit these as much as possible. In addition, a 'first knock' facility helps by providing time for management to assess if the alarm is real prior to a full scale evacuation.

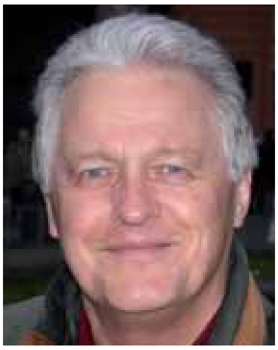
Managers of a site experiencing a lot of false alarms should ask the question 'why?' It could be down to system design and/or staff training. At the moment, without training, many members of the public ignore sounders. In years to come will we become complacent to voice alarm and ignore VA messages?

Whichever system is in place, it should be considered vital that managers and staff are aware of the function and know how to use it. Training and planning are absolutely essential, and the building is only as safe as the most careless person in it. Not only is the training important, so is regular testing. This will help reinforce the training and highlight any shortfalls or failures in the system or emergency plan. Maintenance is also vital, it is a requirement of BS5839 but, maybe more importantly, you want the system to work when you most need it – during an emergency.

People rarely expect to meet a fire scenario, have their plans drastically changed for the day, or suffer injury or loss. People need proper instruction in order to respond – whether it is via efficient, well-trained staff or other means. Remember that, "What if?" is far better than "If only." IFP

Alison Cousins is Marketing Manager at Baldwin Boxall

For further information, go to www.baldwinboxall.co.uk



Graham Collins

Sight & Sound

The introduction of a new standard, EN54-23: Fire alarm devices – Visual alarm devices, is the hot topic regarding beacons and sounders, so now is a good time to look at what is new on the market. First though, Paul Pope of Apollo Fire Detectors looks at the background to this new European product standard and highlights the key considerations.

Shedding a Light on the New Standard

The introduction of a new standard [EN54-23: Fire alarm devices – Visual alarm devices] has been postponed until 31st December 2013, giving manufacturers a further six months to ensure their products meet the standard's requirements.

The overall objective of EN54-23 is to ensure the notification of any individual with a hearing impairment in the event of a fire. The hearing impairment may be permanent; an estimated nine million people in the UK are classed as deaf or hard of hearing, or hearing may be temporarily affected by external factors such as areas of high ambient background noise, the use of ear defenders, or even the intentional limiting of an audible alarm. In these circumstances, audible alarms, known as sounders, are ineffective as the sole means of warning device.

A solution, which has grown in popularity in recent years, due to the introduction of the UK's Equality Act, is a combination of audible and visual alarm devices (VADs) – historically known as beacons. There are many settings where the use of VADs is particularly useful – hotels, hospitals, care homes, and shopping centres to name a few. Current guidance recommends that VADs should be positioned in any location that hearing impaired individuals may be unaccompanied, for example bathrooms, toilets and bedrooms. Note however that these devices are not intended to wake sleeping people.

Until as recently as 2010, no product standard existed in Europe to determine the light output performance criteria and installation requirements of VADs. This has resulted in some inconsistency across how manufacturers declared their products' performance. This is all set to change with the introduction of EN54-23 as, from 31st December 2013, manufacturers will have to meet specific requirements, test methods and performance criteria for VADs. It is hoped that this will enable those responsible for specifying a fire detection and alarm system to compare like with like and identify the best VAD for each application.

The key issue that EN54-23 will address is light distribution patterns or specifically, a product's coverage volume performance. VADs will be classified into three categories depending on the application in which they will be used: ceiling mounted, wall mounted and open class devices. The size of each product's coverage volume will be determined by the distance at which the illumination of a surface perpendicular to the light source achieves illumination of 0.4 lux (0.4lm/m^2).

For the wall and ceiling mounted categories, the VAD has to achieve a specific dispersion pattern, whereas the guidance for open class devices is intended to allow some existing designs to be used or cater for specialised applications. The specifics for each category are:

- **Wall mounted:** mounting height is limited to a minimum of 2.4 metres and illumination is set to 0.4 lux over a cubical space.
- **Ceiling mounted:** mounting heights are fixed at 3 metres, 6 metres and 9 metres (using VADs at heights above 9 metres becomes inefficient) and ceiling devices are required to illuminate cylindrical space.
- **Open class:** the manufacturer is permitted to set the coverage shape as there may be an advantage to using the product in specialised applications

In order to test and certificate a VAD's coverage volume, manufacturers will have to appoint an EU Notified Body. Each VAD, when tested, will be given a coverage volume specification code, which manufacturers will have to make available either on the product itself or on supporting documentation. Apollo, for example, will declare this code in its product guides.

Other EN54-23 requirements that manufacturers must ensure their VADs comply with relate to luminous intensity (min 1cd/or 70% of all measurements points and max 500cd for any measurements point to prevent glare), a flash rate of between 0.5Hz and 2Hz (to avoid the risk of photosensitive epileptic seizures), and the use of only white or red flashes. Importantly, although either white or red flashes are permitted, the chosen colour must be consistent across the whole site. This is particularly important when an existing system is being extended. White flashing lights are generally acknowledged as being the most efficient use of light output and are more effective in alerting as they include a broader spectrum of colour.

Where an assessment has been conducted and the need for EN54-23 VADs within escape corridors or staircases has been identified, there is little guidance in the codes that helps to mitigate the risk of glare to the occupants during evacuations using the new high output VADs.

The LPS1652 Code of Practice for Visual Alarm Devices used for Fire Warning codes places a high emphasis on the designer to account for the highest background level lighting. This may result in excessive glare to the occupants during an alarm condition in periods of low light. If glare occurs, it is possible that susceptible individuals will suffer from visual impairment. This must be considered as part the of evacuation strategy for those at risk.

The FIA (Fire Industry Association) and LPCB (Loss Prevention Certification Board) have jointly produced a useful guide on the standard entitled 'CoP 0001: Code of Practice for visual alarm devices used for fire warning'. It can be downloaded at http://www.redbooklive.com/pdf/CoP-0001.pdf

For more information go to www.apollo-fire.co.uk.

Preparing for the Future

In preparation for the 31st December deadline, APOLLO is developing a range of loop-driven and conventional products that will be certified to EN54-23.

Work is already underway on its new range and the company will be introducing supplementary white flashing visual indicators to ensure that it offers a versatile solution. With a range of VADs and visual indicators, Apollo believes it will be in a position to offer all the component parts of the system and recommend the best solution for each application. In situations where power consumption on the loop is an issue, Apollo's sounder controller and conventional (non-addressable) VADs can be used.

The company will help guide its customers through all of the factors that have to be taken into consideration when determining the most appropriate VAD product for the risk. These include the rating of the VADs to be used, ambient light levels, reflectivity of surfaces, effect of colour, required field of view, usage and occupation and environmental conditions.

While the new EN54-23 standard and associated codes are a welcome move, it is important to remember that after 31st December 2013, existing non-certified EN54-23 products could still be used on fire systems. They cannot be used as visual alarms to give fire warning, but they could be used as supplementary visual indicators. There is certainly still going to be a market for visual indicators moving forward and Apollo hopes that the industry applies the use of VADs appropriately to suit the risks and improve life safety protection long into the future.

For more information go to www.apollo-fire.co.uk

Devices for Ensured Notification

KLAXON SIGNALS has developed a new range of fire signalling devices that, the company says, ensure no one is left behind in a fire emergency.

Sonos Pulse fire beacons and sounder beacons emit a high-brightness pulsating light, complying with the new European standard EN54-23 for visual alarm devices. By using light, Sonos Pulse beacons reach those who may be audibly impaired, or those working in noisy environments, achieving effective evacuation.

Klaxon has developed a new Pulse Alert technology. Pulse Alert is the latest advancement in fire safety, using a powerful pulsating light that provides maximum coverage but uses minimal current consumption. It does this by converting power intelligently, presenting a near-perfect current source to fire alarm panels. Pulse Alert visual alarms require less power than previous models and also exceed EN54-23 light output requirements.

Beacons utilise a lens that is optimised to disperse light evenly over the entire area. This technology minimises hot spots to ensure that all available light is used to alert people in an emergency. A high power LED ensures maximum performance and long term reliability of the system.

Sonos Pulse devices are designed to fulfil evacuation requirements with just a single device for most rooms, reducing costs and increasing energy efficiency. They use the same base connections as previous models; upgrading existing systems to use EN54-23 compliant products is typically a simple process.

For more information go to www.klaxonsignals.com

Explosion-proof Offering

E2S has announced its new GNExS1 (117 dB at one-metre) and GNExS2 (123 dB at one-metre) explosion-proof horns and loudspeakers.

Manufactured from lightweight and cost effective glass-reinforced polyester (GRP), the GNEx family offers what E2S promotes as outstanding corrosion resistance for use in the harshest environments both offshore and onshore.

Both models offer a choice of 45 different alarm tones, including those that meet the PFEER regulations, and a second or third tone can be selected using additional control wires giving the versatility of multiple tones from a single unit at a lower cost. The 15 watt GNExL1 and 25 watt GNExL2 loudspeakers are available in 8 Ohm, 16 Ohm and 100V Line versions. In/out terminals eliminate the need for additional junction boxes in multiple device installations.

The units are launched with ATEX and IECEx approvals; other approvals such as UL, GOST R and InMetro will follow soon. The GNEx S1 sounder has a certified temperature range of –60°C to +50°C at Ex d IIC T4, with extended temperature range of +70°C at IIB T4, so it can be installed in almost all Zone 1 (Cat 2G) and Zone 2 (Cat 3G) areas.

A key feature of the new design is that the flame paths use a large screw thread instead of the usual spigot joint, making it much easier to disassemble, saving time and money during installation. The standard colour for all GNEx products is red, other colours are available as an option as are alternative options on thread entries in place of the standard 2 x M20.

For more information go to www.e2s.com

Low Current, Maximum Coverage

The new LX range from COOPER FULLEON is being heralded as overcoming many of the issues surrounding the introduction of the new EN54-23 standard.

Designed to maximise the number of devises on a circuit while delivering a solution with meaningful room sizes, the LX range utilises patented optic technology, delivering light only where it is needed, helping to reduce the current requirement to a low of 10mA for a 2.5-metre square room; ideal for toilet or bathroom areas.

The optics incorporated into the new range help to deliver market leading performance for red flash – with coverage of up to 7.5 metres at 16mA – coverage of offices, bedrooms and plant rooms. Because this can be achieved with a red flash, the impact on the building occupants is minimised, with no change of custom and practice as a red beacon is easily associated with a fire alarm.

All products within the LX range have two room size settings; 2.5 metres for small areas and 7.5 metres for larger spaces. The flash rate can be set at 1Hz or 0,5Hz, reducing the power consumption at 1Hz from 25mA to 16mA at 0.5Hz. The consumption and room sizes are the same for both the red and white flash.

The range comprises the Solista LX wall and ceiling beacon, the Rolp sounder and beacon base and the Symphoni low current sounder and LX base. All certified to EN54-23 with the Solista LX available now, and the Rolp and Symphoni LX available from the end of August 2013.

For more information go to www.cooperfulleon.com

Harsh Environment Solutions

E2S has introduced the new D range of alarm sounders and combined sounder/beacon warning signals for use in harsh environments where high temperatures, shock and vibration or high UV levels are anticipated.

Using the electronics of its well-established A Series, the D range is housed in a robust, corrosion resistant LM6 aluminium alloy enclosure, which E2S claims gives greater mechanical, temperature and UV protection than an equivalent plastic-bodied device. The D105 is rated at 112 dB at one-metre and the D112 at 117 dB at one-metre; both types are also available combined with a Xenon strobe or LED beacon to generate both an audible and visual alarm from a single unit.

According to E2S, testing has proven that a metal housing offers far greater protection at elevated temperatures than a plastic enclosure and is particularly suited to outdoor applications such as mining conveyors, where high ambient temperatures and sustained vibration can be experienced. Both units offer a choice of 45 different alarm tones and, with the option of activating a second and third tone via additional control cables, they are a cost effective signalling solution that offers the versatility of multiple tones from a single unit at a lower cost. The devices can operate from 12V, 24V and 48V DC as well as 115V and 230V AC. A UL approved version is also available.

For more information go to www.e2s.com

New Range of Compliant VADs

HOCHIKI EUROPE has announced the immediate availability of its new range of EN 54-23 compliant visual alarm devices (VADs).

The new VADs emit a red or white light and are classified into three distinct categories based on their intended application – ceiling mounted devices, wall mounted devices and an open class category – with a specified light output of 0.4 lumens a square metre or 0.4 Lux.

In order to guarantee their performance, Hochiki Europe has had its VADs tested and assessed by an EU notified body to determine their coverage volume, based on the distance at which the required illumination is met.

For more information go to www.hochikieurope.com

New Technology R
Room Fire Suppre

Scott Starr

Firetrace International

Total room flooding systems are now in widespread use around the world protecting a variety of mission-critical installations – particularly computer suites and communications centres – from the ravages of fire. They are also to be found safeguarding document archives and irreplaceable heritage, artistic and historic artefacts in galleries and museums. However, the development of delivery system designs has not kept pace with the introduction of the latest clean agent suppression agents.

In the past two decades or so, since the Montreal Protocol – the international treaty designed to protect the ozone layer – came into force, much of the fire industry's attention has been focused on replacements for the Halon 1301 gaseous suppression agent that the treaty banned. The intervening years saw the introduction of a number of substitute systems. Of these Halon-like halocarbon or HFC alternatives, some proved of worth, while others failed to come up to the mark due to either a lack of operating efficiency or unacceptable toxicity. Their availability on the market nevertheless certainly aided the Halon phase out programme and assisted in the move away from ozone depleting substances.

Since 3M™ introduced its Novec™ 1230 Fire Protection Fluid in 2003, many in the fire protection industry – fire suppression system manufacturers, installers, fire safety engineers and specifiers – have adopted it as a suppression agent of first choice.

The Missing Ingredient

While the environmental, sustainability and performance credentials of Novec 1230 Fire Protection Fluid are now well understood, since its introduction little has been done to capitalise on the unique characteristics of the agent.

Until now, delivery system design has effectively languished in the 1990s, with solutions conforming to conventions and design limitations developed specifically for Halon 1301. The result is that the entire raft of benefits that Novec 1230 Fire Protection Fluid has the potential to deliver has never been fully exploited. Total room flooding installations have often remained far more complicated than necessary; installation costs have been markedly higher; design flexibility has been greatly restricted; and installation times have been significantly longer than necessary.

These shortcomings have now been resolved. Following an extensive research and development programme and thorough in-house and third-party testing, USA-based Firetrace International has unveiled its "next generation" evolutionary system with approval testing that has demonstrated that the system delivers substantial and measurable performance enhancements when compared with traditional delivery systems. The "industry standard" flow calculation method has been optimised in order to exploit the superior flow characteristics of the Novec 1230 Fire Protection Fluid.

Evolutionary Engineered Fire Suppression

Firetrace International's new engineered clean agent technology system is called E^4. It uses 35bar (500psi) high pressure efficiency, utilising lower-cost, low pressure hardware that has been optimised for the characteristics of Novec 1230, while achieving the performance of more costly high-pressure or "nitrogen driver" systems.

The system complies fully with every aspect of NFPA 2001: 2012 (Standard on Clean Agent Fire Extinguishing Systems) and BS EN 15004:2008 (Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance).

In addition to incorporating a number of innovative engineering developments, the new E^4 system offers system installers greater flexibility, speedier installation, significantly lower overall installed cost and a measurable competitive edge.

edefines Total ssion

End-user benefits come in the form of a much lower financial outlay when compared with other systems on the market, and greatly improved design freedom. Significantly, by merely replacing the cylinders and nozzles, E^4 provides a swift, least-cost transition from most existing Halon systems to 3M Novec 1230 Fire Protection Fluid clean agent technology.

The system is designed to drastically slash the amount of piping used, and the number of tees and nozzles, with savings on distribution network alone being typically between 25 percent and 40 percent. At the same time, the challenge of having to accurately equally balance the amount of agent at Bull T and Side T connections has been overcome, plus extra pipe lengths between tees is either minimal or completely unnecessary. With E4, Firetrace International engineers have devised a system where the Bull T split can be up to an 88/12 split, while the Side T can be as much as 55/45 and 93/7 split.

The result is an installation that can show more than a 50 percent saving on labour costs – irrespective of the size of the installation – by "smart" pipe layouts that are impossible to achieve with the design limitations of industry-standard systems.

The actuation system has been designed to be stackable, and the cylinder storage problems often associated with gaseous total flooding systems have been consigned to the history books. With the new Firetrace offering, the distance between the agent storage cylinder and the discharge nozzle is more than 300 percent longer than old-technology systems on the market, and the vertical distance is increased by more than 400 percent, so the remote storage of cylinders is no longer a challenge.

With conventional systems the maximum possible cylinder-to-nozzle distance is frequently no more than 20 metres to 25 metres. This often means that cylinders have to be located in the room being protected. However, thanks to the extended pipe lengths achievable with E^4, the distance benefits associated with inert gas systems are now achievable with Novec 1230. So, by capitalising on these extended pipe lengths and utilising an array of directional valves it is feasible to protect an entire facility from a single bank of E^4 cylinders.

The liquid agent-to-pipe volumes are up by 700 percent; and higher fill density means more agent in the same hardware. And all of this is achieved without the need to incorporate expensive Nitrogen driver systems, so making it possible to install the largest possible networks without having to resort to incorporating extra equipment.

E^4 system cylinders are available in eight capacities with fill volumes ranging from 4kg (8lbs) to 590kg (1300lbs) – the largest single cylinder capacity in the industry. Each of these cylinders can be under-filled in half-kilogram increments to provide the exact amount of required Novec 1230 agent. Systems can be activated either manually or automatically using mechanical, pneumatic or electrical activation. High flow rate nozzles reduce the number required and are available in centre and side discharge patterns for pipe sizes ranging from 12.7mm (0.5 inches) to 63.5mm (2.5 inches).

Firetrace has assessed that more than 75 percent of the existing Halon distribution networks around the world can be easily and cost-effectively refitted with its E^4 utilising the existing piping. This presents installation companies with a major business opportunity while, for end user organisations with Halon systems, it offers the very real prospect of minimised system downtime and the shortest possible business interruption, as well as substantial cost savings.

Genuine, Lasting Sustainability

Novec 1230 Fire Protection Fluid provides an opportunity for end users to fully embrace sustainable and environmentally-welcome technology. The agent leaves no residue to clean-up after discharge, and does no damage to the sensitive electronic equipment or documents it is intended to protect. Significantly, Novec 1230 is also safe for discharge in occupied areas, offering the highest safety margin of any clean agents.

Novec 1230 is stored in cylinders as a low vapour pressure fluid that transmutes into a colourless and low odour gas when discharged. The agent has zero ozone depleting potential and a remarkably low atmospheric lifetime – the time it takes to break down in the atmosphere – of just five days. It also has an insignificant global warming potential of one.

Added to these impressive environmental suppression agent credentials, the E^4 system makes a major contribution to carbon footprint reduction. This is due to the significantly reduced amount of material E^4 utilises to protect a large facility, by using a single bank of storage cylinders connected to directional valves instead of having to install individual systems to protect individual rooms. This results in savings in raw materials, less energy being expended in processing and manufacturing, reduced transportation and decreased emissions.

The Firetrace E^4 cylinders are UL (Underwriters Laboratories) listed and are manufactured, tested and stamped in accordance with DOT 4BW500 or DOT 4BA500.

Significantly, in an era when every square metre of floor space has to earn its keep, Novec 1230 storage requires fractionally over a third of the space of a CO_2 installation and just over ten percent of the space demanded by an inert gas system. In fact it occupies a similar footprint to a Halon 1301 installation.

E^4 is manufactures by Phoenix, Arizona-based Firetrace International in an AS9100C/ISO 9001:2008-certified facility. It was unveiled in Europe at International Firex in the UK and in the USA at the NFPA Conference & Expo. IFP

Scott Starr is Director of Marketing at Firetrace International

For further information, go to www.firetrace.com

Firefighters can extinguish a fire progressing in a void only by removing the wall

ASFP
ASSOCIATION FOR SPECIALIST FIRE PROTECTION

Building a Safe & Sustainable Future

Changing construction materials and methods can have a devastating impact on fire safety. The risk of fire spread in buildings built utilising modern methods of construction, was the subject of a series of seminar sessions hosted by the Association for Specialist Fire Protection at Firex International in May in the UK.

In the *Sustainability vs Fire Safety: can one undermine the other?* seminar, the real costs and the social impact of fires in modern buildings were outlined from an insurance perspective, emphasising the essential need for 'joined up thinking' throughout the design, build and maintenance process to ensure that the real risks of fire are recognised.

Dr Jim Glockling of the Fire Protection Association explained that sustainability in building may be achieved in many ways. For example, a sustainable building might be made of 'renewable' materials, or from materials that are by-products of other processes. It might be capable of generating its own energy or using energy very efficiently; or it might hold on to introduced energy effectively through insulation, recover energy from water and air effluent emissions, be recyclable, or have a very long lifespan.

He described the normal model lifespan of a modern building constructed from new and recycled materials. "These materials are deployed in the construction in a manner sympathetic to their future recycling; the building is used; and at the end of its working life, deconstructed. The materials freed up at decommissioning follow the normal route of re-use, recycle, recover energy and discard, in that order of preference," he said.

However, fire is one key factor that is generally not addressed in this idealised sustainable building cycle, he declared: "Fire releases the stored carbon dioxide content of any material that will burn; it renders many materials non-recyclable, necessitating the disproportionate discarding of previously re-useable materials and the fresh purchase and transport of new materials for rebuild."

Noting that it could be argued that this is the case for any building construction method,

Incorrect use of intumescent collar in timber floor

Dr Glockling said that it is particularly relevant to some of the more modern building methods since they introduce large quantities of combustible materials into their designs; such materials include wood, polystyrene and other recycled materials such as tyres, pallets and other plastic casings. The use of these materials alters both the probability of fire and the potential scale of loss when a fire does happen.

He explained that in assessing buildings, insurers are interested in ensuring that claims are within an Estimated Maximum Loss (EML) expectation. He said that factors that might influence the EML include:

- Size, height, shape and value of a business.
- Construction of roof, walls and floors.
- Presence of combustible materials.
- The nature, distribution and combustibility of contents (fire load).

He noted that fire protection systems – be they active, passive, preventative or intervening – are seldom taken into account in these calculations as they are assumed to fail.

Dr Glockling also highlighted that there is a higher likelihood in MMC (Modern Methods of Construction) structures for compartment walls to be breached, since holes are easier to make. He also noted that such projects tend to use energy systems to generate, recover and store energy and these involve more distribution systems connecting between compartments and thus more compartment breaches.

Modern Methods of Construction

The ASFP's technical officer, Niall Rowan, continued the discussion. He explained that modern methods of construction include constructions involving steel frames; pre-cast concrete frames; panellised units; modular and volumetric buildings; structural insulated panels (SIPs) and timber frames. He stated that such constructions often involve prefabricated units, resulting in less waste, less site handling and greater flexibility of design.

Mr Rowan concentrated mainly on issues related to timber frame construction, explaining that several significant fires had occurred both during construction and after occupation in these buildings.

Using a number of case studies, he described how fires on timber frame construction sites had resulted in very rapid fire spread, generally resulting in the complete destruction of the buildings. However, he explained that the UK Timber Frame Association (UKTFA) had introduced a range of fire safety initiatives to improve the performance of such sites. These include the introduction of a risk assessment checklist; separating distance guidance and other site safe initiatives, including a 16-point safety plan. He also noted that UKTFA had formed a working party with the Chief Fire Officers' Association to address this issue and was conducting research.

Post-occupation Fires

Nevertheless, Mr Rowan said there continued to be some concerns related to occupied buildings of timber frame construction. He explained that timber frames are susceptible to low intensity ignition sources, such as consumer unit ignition, cigarette ends, external sweating of the solder joint on boiler pipes and radiation from other fires. They are also less tolerant of poor quality installation.

The collar should be below the floor not mounted within it

He asked whether changes to the building regulations were necessary to address some of the concerns, suggesting that potential solutions could include combustion modifying timber sheets; restricting timber-framed construction to low rise premises, or installing sprinklers. He also asked whether this construction type should be restricted to certain uses and whether a stay-put policy is still appropriate in such buildings.

Mr Rowan noted that many of the problems were the result of poor quality construction and acknowledged that the timber industry was not alone in suffering from these issues. "There are problems with poor quality passive fire protection in all building types, but timber frame is less robust and so less able to cope. This leads to significant concerns in occupied buildings," he declared.

"The solution is better quality buildings supported by effective enforcement of compliance. The ASFP supports this by encouraging third-party certification for products and contractors and by recommending the use of specialist contractors for installing passive fire protection."

High-rise Design

A number of industry experts were brought together to consider *High Rise Cladding – Great Looking but Deadly?,* in a session that highlighted the particular issues facing high-rise building designers and contractors, as building practices and materials change.

Neal Butterworth, Associate Director at Arup, addressed high-rise fire strategies focusing on preventing vertical fire spread and the conflict between insulation and fire safety. He outlined the main components of a high-rise fire strategy as containing fire and smoke; preventing collapse; enabling evacuation and providing access for firefighting.

He explained that since high rise strategies rely on the prevention of vertical fire spread, the consequence of vertical fire spread is high. As a result, the likelihood of system failure must be kept sufficiently low, or the consequences of such a failure reduced. He asked whether the rapid introduction in quantity and type of new insulation material was changing the behaviour of fires and providing a mechanism for rapid fire spread. He concluded that fire can no longer be considered in isolation and called on designers to proactively identify acceptable levels of risk and design accordingly; to design, specify, install, operate and maintain fire systems correctly; and to consider all relevant design fire scenarios and test against potential system failure.

Stephen Howard, Business Group Manager Passive Fire, BRE Global Limited used a number of case studies to explain the mechanisms of external fire spread in high-rise buildings. He provided an overview of the Building Regulations in the UK as they apply to limiting internal and external fire spread.

He also provided an overview of BS 8414-1: 2002 (Test method for non-load bearing external cladding systems applied to the face of the building) and how this relates to full scale testing classification to BRE's BR135 (Fire performance of external thermal insulation for walls of multi-storey buildings). Mr Howard explained the importance of using third-party certificated products describing two loss prevention schemes that apply; LPS 1581 for masonry-backed systems, and LPS 1582 for non-masonry-backed systems.

Further information on the regulations and codes that apply to cladding products, their installation and inspection was provided by Andy Dean, Business Development Manager, Exova Warrington Middle East. Describing several high-rise blazes in which external vertical fire spread was involved, Mr Dean again highlighted the importance of using third-party certified products in these types of application. He outlined the certification process both for products and installers. He noted that, in the Middle East, building codes tend to use a combination of British and American standards, which can cause issues.

The session was brought to a close by Andy Kay, Sales and Marketing Manager, Siderise Insulation UK, who explained the role of cavity barriers for curtain wall and rain-screen façade. He explained that the cavity fire breaks required vary with the type of façade but said that all cavity barriers should be capable of accommodating all structural, settlement, drying shrinkage, creep, thermal and moisture movements of the building frame and/or façade without dislodging. IFP

For further information, go to www.asfp.org.uk/webdocs/Firex%20Seminars.php

Fire: Business Interruption & Consequential Damage

Russ Timpson

Horizonscan

UK national fire statistics tell us that deaths and injury are at an all-time low in the UK and the trend is downwards. This should be applauded as a success for all those who manage and mitigate the risk of fire. Conversely the rate of business interruption cost and consequential damage is rising from the fires that continue to occur.

If everyone in the fire safety community agrees that continual improvement is essential, what is the next step that must be taken to address the non-life safety ramifications of unwanted fires? Colleagues in the insurance industry work on a ratio of $2 of business interruption cost for every $1 of direct cost to replace buildings, plant and stock. A commercially sobering thought.

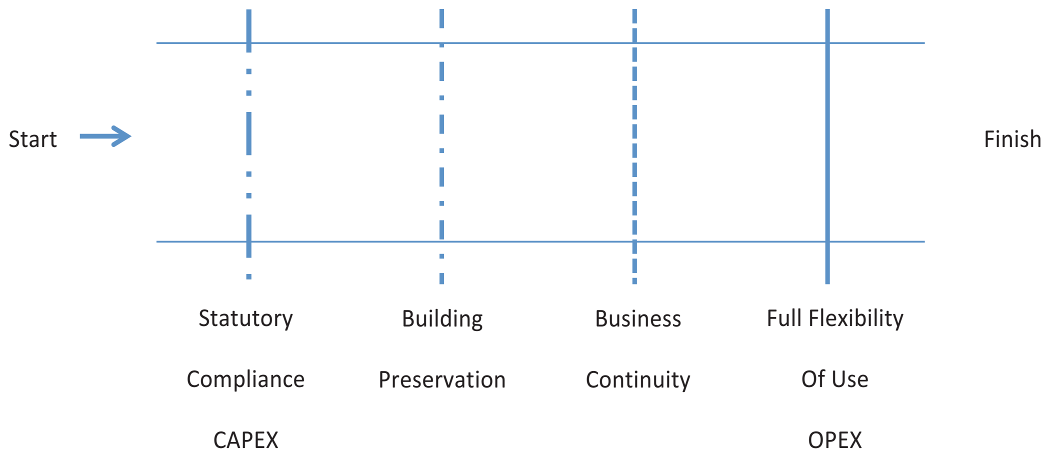
Recent publications would indicate that there is an emerging need to address the business interruption costs of fire. British Standards PD 7974-8:2012 (Application of fire safety engineering principles to the design of buildings, property protection, mission continuity and resilience) is a good example. Approved document B of the Building Regulations, incorporating insurer' requirement for property protection has been around since 2008.

So the tools are there to help the fire safety professional, but why are they being overlooked? Is the time right for forward thinking fire engineers to take a more strategic business stance? When making a business case or delivering training, how many people in our industry resort to showing the Bradford football fire video for impact value? Tragic and visually shocking as it is, it means nothing on a business case spread-sheet.

The development of an international standard for business continuity (ISO 22301) in late 2012 has finally provided a system that can be implemented across business sites on all five continents. When the standard was published it was one of the fastest and biggest selling standards that BSI had ever produced; an indication of the appetite for improved business resilience, and capability to withstand crisis events such as serious fires.

The Fire Safety Corridor

In my career to date, I have found the following model useful for persuading project managers to invest in additional fire measures other than those required for building control approval. The trick is not to allow the agenda to be dominated by a fixation on capital expenditure of the project (CAPEX), but rather consider the lifetime operational costs of the building (OPEX). CAPEX will obviously reflect the design and build costs, and pressure will be exerted on fire engineers to



The fire safety corridor

reduce costs by minimising fire resistance of materials, reducing the number of staircases and avoiding the need for sprinklers and other fixed systems. In contrast, OPEX should take into account factors such as maintenance costs, flexibility of use of the building, insurance premiums and resilience of the building. Going forward we may well see office buildings used for residential accommodation with retail and storage thrown in for good measure. High specification of fire safety equipment in a building will assist with this flexibility.

The conceptual model of a fire safety corridor is a design journey that starts with the need to satisfy statutory compliance. This also implies that statutory compliance is the lowest level of building fire risk performance. As the line denotes, this leaves lots of gaps for fire risk to incubate over a period. Moving further down the corridor we reach a level of building performance that will deliver building preservation for foreseeable fires in the building, including arson. This may include provision of sprinklers or other fixed systems. The Business Continuity level of performance means that the building fire specification will provide statutory compliance (everyone gets out), Building preservation (the building is viable post-fire) and ensure that the business function of the building will not be fatally impaired; that is, post-fire clean up and return to work will be quick and straightforward. The highest level of performance is 'Full Flexibility of Use'. This means that the building can adapt to significant changes of use without the need for major changes to fire design and strategy, it can also be deemed to have 'fully protected status' as some insurers call it.

Definitions

Business Continuity

"Business Continuity Management (BCM) is an holistic process that identifies potential threats to an organisation and the impacts to business operations that those threats, if realized, might cause. It provides a framework for building organisational resilience with the capability for an effective response that safeguards the interests of key stakeholders, reputation, brand and value-creating activities."

Resilience

"The ability of an organization to absorb, respond and recover from disruptions."

BSI is the source for both of these definitions.

Risk Registers

Most large companies will develop and maintain a 'risk register' as part of their accounting and compliance activities. These registers typically record commercial risks such as loss of share price and damage to reputation. Nearly always at, or near the top of most registers, is a risk normally known as 'loss of major asset' such as a building, factory or plant. The typical cause for the loss is fire, and the mitigation for the loss is normally listed as building design and business continuity plans. This is a major opportunity for fire risk professionals, as registers would indicate that they are custodians of one of the main business risks, rather than just compliance agents.

Case Study

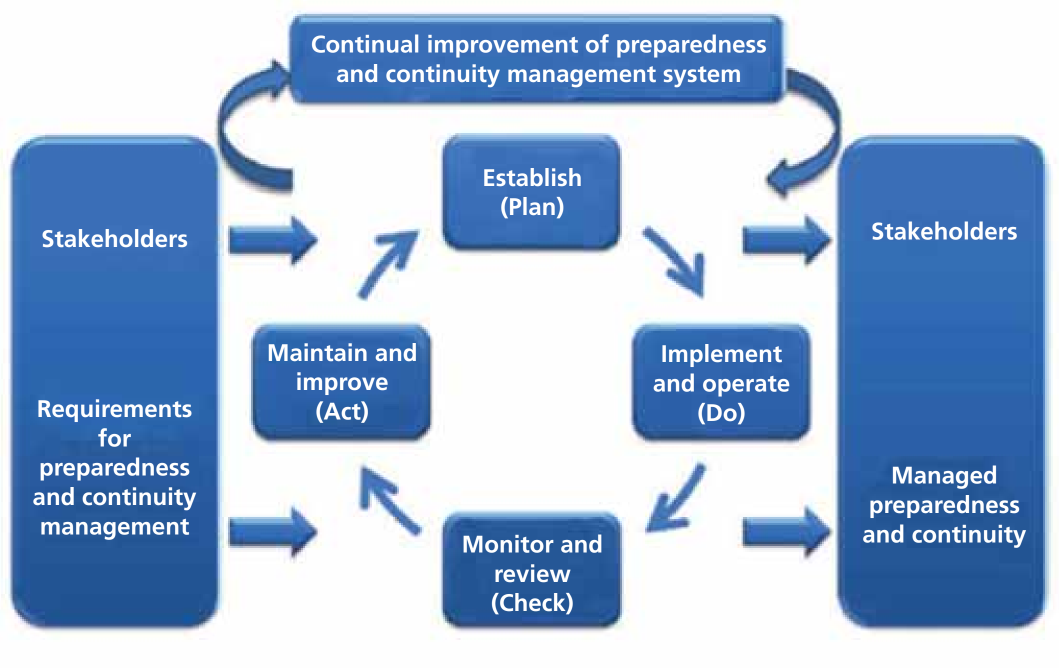
Horizonscan specialises in simulating business crisis events, and training business management teams to respond, stabilise and work through the process of business continuity. One existing client has a large factory producing high quality electrical connectors for the aerospace industry. A crisis scenario was developed that would heavily disrupt the business. The scenario involved a fire within an area used for electroplating and containing several large vats of hydrochloric acid. The sequence of events included a release of chemicals near to a local residential area.

Liaison with local firefighters led to the business continuity exercise being used as a training event and the deployment of a full chemical response unit. Suffice to say that much was learnt on both sides; business management and firefighters. Several improvement recommendations were enacted and training undertaken. As fate would have it, the identical fire scenario happened for real some six months later, and was dealt with quickly, professionally and with a minimum of business disruption. The company now has a policy of undertaking a crisis simulation once a year as standard.

The development of an international standard for business continuity (ISO 22301) in late 2012 has finally provided a system that can be implemented across business sites on all five continents. When the standard was published it was one of the fastest and biggest selling standards that the British Standards Institute had ever produced, which is an indication of the appetite for improved business resilience, and the desire to achieve the capability to withstand crisis events such as serious fires.

New Business Continuity Standard

International Standards Organisation (ISO) 22301 – Business Continuity Management systems has been developed on the back of many predecessor documents from around the world. It sets out, for the first time, an auditable process for making businesses more resilient. Readers may be familiar with standards such as 9001 (quality), 18001 (health and safety) and 14001 (environment).



Plan, Do, Check, Act process of BS 22301

These standards are based on the management process of Plan – Do – Check – Act (PDCA). This has been described as a virtuous circle of continual improvement.

Now that business continuity has achieved ISO status, it can be considered likely that it will follow the other standards mentioned previously, as part of business contract and tender pre-requisites before companies will do business. This commercial driver of business resilience is another opportunity for the fire safety professional to add value to his or her organisation. If, via the vehicle of fire risk management they can promote resistance to disruptive events and promote the skills of crisis command, they will become more inherently valuable than a purely compliance resource.

There are seven main causes of business continuity disruption that require plans:

1 Loss of major asset – building, plant or vehicles: Fire.
2 Loss of a key service – gas, water, electricity: Cable strike by digger.
3 Loss of IT – electricity, data, servers: virus.
4 Pandemic: H1N1 virus.
5 Loss of a key person – someone with singular knowledge in a business: accident.
6 Denial of access – no access to work site: scene of a crime.
7 Product recall – contamination: blackmail.

Detailed, highly specific plans are not recommended for each possible loss scenario that may occur. It should be noted that a functioning business continuity process is far more effective than pages of plans. As US president, Dwight Eisenhower, said "Plans are nothing, planning is everything".

Examples of resilience activity that fire safety professionals can take the lead on:

- Fire pre-planning; plans, premises information boxes.
- Insurance liaison – discussing the fire aspects of insurance surveys.
- Fire Service Liaison – organising drills and familiarisation visits.
- Salvage planning.
- Facilitating desk top exercises.
- Crisis command training (if from a fire service background).

The distinction between compliance and resilience is important for the fire safety professional going forward. The first implies cost and little commercial value, while the second is increasingly seen as a vital aspect of modern business in a changing world.

Conclusion

The distinction between compliance and resilience is important for the fire safety professional going forward. The first implies cost and little commercial value, while the second is increasingly seen as a vital aspect of modern business in a changing world. The acronym VUCA was coined at a recent Institute of Directors meeting by a speaker discussing the current business environment. The speaker said that the future will be increasingly Volatile, Uncertain, Complex and Ambiguous.

Business continuity and resilience can be used a useful lever for increasing the fire safety specifications of buildings. The bar for fire safety is set relatively very low when complying with the approved codes and standards in the UK. With reducing national fire statistics the pressure to reduce investment in fire safety will increase. This must be countered with a well-constructed position based on business needs and values.

Looking to the future with reduced levels of fire cover and high levels of inter-business dependency, this is a good time for fire safety professionals to embrace the new challenges of resilience and business continuity. IFP

Russ Timpson is the founder and CEO of Horizonscan

For further information, go to www.bcptesting.com

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THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Front Cover: 3M Interam Endothermic Mat ('E-Mat') for hydrocarbon fire protection of cable trays". Pic Courtesy of 3M United Kingdom PLC

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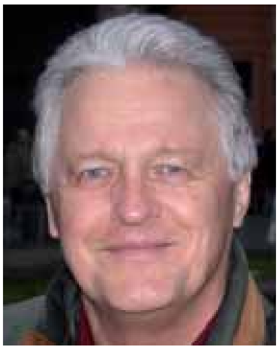

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Caveat Emptor – Let the Buyer Beware

Poor quality, unsafe or unapproved products that simply do not comply with the standards and codes claimed for them, and counterfeit products purporting to come from reputable manufacturers continue to crop up around the world. While most people immediately associate this problem with "harmless" consumer items such as fake watches, perfumes and training shoes, such incidents in the fire industry do occur, and do have the potential for dire consequences.

The problem is very real, and very threatening. For example, according the Approved Cables Initiative, an organisation set up to "… address the issue of unsafe, non-approved and counterfeit cable entering the UK marketplace…" as recently as June of this year South Korean authorities halted operations at of two of its nuclear power plants, having discovered that a company contracted to conduct performance tests on control cables had fabricated the results. Apparently, the cables in question are responsible for cooling nuclear fuel or preventing the release of radioactive materials during an emergency. They failed to meet international standards for capacity to withstand changes in voltage and pressure. A further four nuclear reactors that, at the time, were either shut down for scheduled maintenance or were under construction, have also been found to be using cables that had failed tests.

Demanding third-party accreditation by fully-accredited independent test certification organisations is surely then the only way to go, as the majority of reputable manufacturers readily acknowledge. The reality is that today, it is simply not sufficiently diligent to rely on what you are being told by a supplier or shown on sales literature or websites. It is essential to corroborate that the information you are being given is not misleading, incorrect, or simply downright dishonest. But when doing so, remember that rogue manufacturers are every bit as willing to fake third-party accreditation certificates as they are NFPA, BS or EN standards compliance, so always check direct with the accreditation organisation that the claims are genuine.

There are companies out there that are also quite prepared to misrepresent their accreditation. I recall one instance a couple of years ago where a particular company's sales literature carried the logo of one of the world's leading product certification organisations. The company had every right to include the logo, as it had achieved an international quality management standard, but the way in which it had been included on its literature might easily have been taken as implying that the products themselves had been tested and approved.

So surely the message is clear. The more difficult we make the counterfeiter's life and reduce his chance to make easy money, the sooner this scourge will come to an end. But, this will not happen on its own; we must all play our part to the full. Wholesalers and distributors must verify the quality of the products they are stocking; contractors and installers must be equally diligent and avoid buying from suppliers that have shown to be prepared to turn-a-blind-eye to the issue; and fire engineers and building services consultants should be ever watchful for substandard product substitution.

The importance of this third-party accreditation lies in the fact that the specifier, the trade supplier and the installer can be sure that the product being supplied today is manufactured to precisely the same standard and specification as the product that was originally tested and approved. If what you are offered is from a producer that does not have this third-party accreditation there is, in reality, no guarantee whatsoever that it is manufactured to the standard being claimed for it.

The harrowing realisation is that these rogue manufacturers are not in the least bit concerned about anyone's welfare; they are simply interested in maximising profits. They do not care about fire safety, but thankfully, we do. IFP

Marine & Industrial Passive Protection

PPG INDUSTRIES has announced the launch of a new application of Pitt-Char XP, a flexible epoxy-based intumescent passive fire protective coating suitable for environments where exterior durability and corrosion resistance are required. It utilises established technologies to prevent steel structures from heating up rapidly in the event of a fire by providing insulative protection against high temperatures.

The product can also be used as an insulative method of protecting structural steel from exposure to the extremely cold temperatures that can result in the event of a cryogenic liquid spill, a feature that is of particular interest to the LNG market. It offers low-temperature flexibility, cryogenic capability, hydrocarbon fire protection, jet fire resistance and blast resistance, and can be used in environments where hydrocarbon pool and jet fires are a risk, particularly under cryogenic and explosion overpressure conditions. PITT-CHAR XP provides enhanced resistance to cracking on flexing and vibrating structures and delays the loss of load-bearing capacity and integrity, buying time for personnel to evacuate to a safe area.

To protect against a hydrocarbon fire, where environmental temperature can increase up to 1,100°C almost immediately, Pitt-Char XP is applied at a thickness of 4mm to 25mm. When exposed to fire, the epoxy coating protects the underlying steel from rapid heating by expanding and forming a ceramic-like layer of char that will be up to six times as thick as the original coating, insulating the steel against high environmental temperatures.

In the case of a cryogenic liquid spill, temperatures can suddenly drop down to –162°C meaning that any insulation system protecting the steel needs to withstand these extremely low temperatures without becoming brittle and failing. The coating is applied in thicknesses ranging from 15mm to 38mm. After exposure to a cryogenic spill, the coating typically remains relatively undamaged and no additional maintenance is required. If a fire ensues, however, the coating will expand at high temperatures and form a protective char.

For more information, go to www.ppg.com

Emergency Lighting Addition

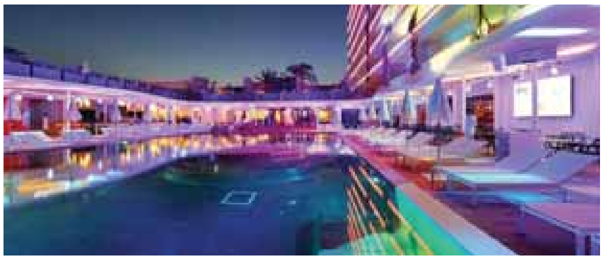
COOPER LIGHTING & SAFETY recently launched its new Zetalite 3 LED emergency luminaire that it expects to sell 200,000 a year.

Zetalite 3 LED is described as "….a next-generation emergency lighting luminaire that is affordable, maintenance free, and supplied with a self-contained battery unit. It is a reliable solution for safe emergency egress lighting and is suitable for a wide range of applications, including escape route lighting, open area, anti-panic emergency lighting, and external over door lighting."

Its low-energy consumption in both maintained and non-maintained modes offers a significantly reduced cost of ownership over the product's lifetime. It is fully compliant with all the latest legislation surrounding emergency luminaires, is suitable for both indoor and external use and is sealed to IP65 for dusty, damp or wet conditions. It also offers a long life of nearly 50,000 hours and a three year warranty. The luminaire can be mounted on surface ceilings or walls as it features a flame retardant luminaire body and lens. It runs off a reliable nickel cadmium battery system and is comprises 12 0.25-Watt white LEDs.

For more information, go to www.cooper-ls.com

Party-time Fire Safety



APOLLO fire detectors were selected for the new wing of the eight-story, 181-room Ushuaïa Ibiza Beach Hotel on the Balearic Island of Ibiza. The luxury venue boasts two restaurants and conference facilities for up to 200 people and is also famous for hosting open-air parties, attracting up to 5,000 people a night.

Due to the vibrant nature of the hotel and the fact that very loud music is a feature of the Ushuaïa experience, the Apollo design team recommended a wide variety of interior and exterior fire sounders and visual indicators, including multi-tone alerts. In total, nearly 650 Apollo XP95 detectors were specified to meet the main fire detection requirements. The intelligent system was designed around two networked four-loop Kentec Syncro fire panels approved and certified to EN54 Parts 2 and 4.

For more information, go to www.apollo-fire.com

Advanced Protection for Romanian Library

ADVANCED has supplied an array of ExGo suppression control panels to safeguard the priceless collections of the new National Library of Romania in Bucharest. The new building contains more than 13 million individual items and was opened in 2012.

The suppression control system comprises 47 inter-linked ExGo panels with LCD displays, LED indicators and manual release buttons. The panels monitor and control the valves that release up to 20 tonnes of Novec 1230 fire protection fluid and integrate with the Library's fire system, which includes over 600 optical smoke detectors, 100 sounders and 200 call points.

The ExGo range has been developed specifically for sensitive and strategic assets such as server rooms, historic and cultural attraction. It combines the company's fire alarm systems with an extinguishant release system that is compatible with all leading extinguishant providers. The patented ExGo Extraction Software also allows users to download system status information and event logs, providing a quick and customisable data solution.

The system is fully compliant with relevant EN54 fire standards (Parts 2, 4 and 13) and EN12094-1 extinguishing standards.

For more information, go to www.advancedco.com

Tunnel Firefighting System Test

SP TECHNICAL RESEARCH INSTITUTE of Sweden is planning to test a fixed firefighting system that has not previously been used in tunnels for road tunnels in the Stockholm Bypass – a proposed new highway where about 50 kilometres will pass through a tunnel.

The firefighting system was developed by the Swedish Transport Administration and the fire consulting company, Brandskyddslaget, in collaboration with SP. It is said to be a simple and relatively inexpensive solution where large water droplets are sprayed from nozzles in a tube that is mounted along the ceiling in tunnels.

The fire tests will be conducted in mid-September of 2014 in the disused Runehamar Tunnel in Norway. 420 wooden pallets will be placed in the tunnel to simulate the pay load of a truck. This is expected to produce a fire that radiates energy at about 100 million watts.

For more information, go to www.sp.se

Beam Smoke Detector Upgrade

FIRE FIGHTING ENTERPRISES has upgraded its Fireray 5000 optical beam smoke detector with separate fire and fault relays for two detector heads attached to a single controller unit. This means that one ground-level unit can control two detector heads but any alarm or fault signal will be located to each specific head. An event device history log has also been added, and power consumption has been reduced even lower than on the original model.

Having two detector heads on one controller allows even larger spaces to be covered from a single control unit. Separate fire/fault relays have been added for each detector head, which will enable addressable systems to identify which of the detector heads has been triggered. The separate heads are independently configurable, with separate range, alert threshold and delay settings possible.

This upgrade is fully backwards-compatible with existing systems, and the new event history log stores up to 50 detector events such as alarms, servicing and power status changes.

For more information, go to www.ffeuk.com

Explosion-proof Sounders & Loudspeakers launched

E2S has announced its new GNExS1 (117db at one-metre) and GNExS2 (123db at one-metre) explosion-proof horns and loudspeakers. Manufactured from lightweight glass-reinforced polyester, the GNEx family is claimed to offer outstanding corrosion resistance for use in the harshest environments both offshore and onshore.

Both models provide a choice of 45 different alarm tones, including those that meet the PFEER regulations, and a second or third tone can be selected using additional control wires giving the versatility of multiple tones from a single unit. The 15 watt GNExL1 and 25 watt GNExL2 loudspeakers are available in 8 Ohm, 16 Ohm and 100V Line versions and In/Out terminals eliminate the need for additional junction boxes in multiple device installations.

The units are launched with ATEX and IECEx approvals; other approvals such as UL, GOST R and InMetro will follow soon. The GNEx S1 sounder has a certified temperature range of minus 60°C to plus 50°C at Ex d IIC T4, with extended temperature range of plus 70°C at IIB T4 so it can be installed in almost all Zone 1 (Cat 2G) and Zone 2 (Cat 3G) areas.

For more information, go to www.e2s.com

Leading University tackles hard to access detectors

Britain's University of Leeds has overcome the challenge of testing hard-to-access point detectors and ASD (aspirating smoke detection) systems by installing Scorpion, the recently launched remote test solution from DETECTORTESTERS.

Scorpion is a micro smoke generator that is installed permanently, adjacent to a detector or sampling hole on an ASD pipe, typically at the end of the run. The smoke generator is cabled back to a Scorpion control panel mounted at a convenient, easy to access location at floor level for functional testing of the detector.

With buildings built in different styles, materials and sizes, the University faces numerous challenges when it comes to testing the fire systems. Among the challenges faced are restricted or difficult access, architectural and aesthetic considerations, operational use of different rooms, and year-round availability of the building for students. These make testing of the fire system difficult and expensive, with extra labour costs and specialist hire equipment often needed. Scorpion has been installed on an ASD system protecting an archive area within the university – allowing simple testing of the fire system from outside the enclosure – with no additional costs and no disruption to the daily activities of the site. Several other suitable locations for Scorpion have been identified at the University, which will soon be live.

For more information, go to www.scorpion-tester.com

German Lab's Accreditation

Exova Warringtonfire Frankfurt has gained recognition as a testing facility for materials and components to the construction sector in Germany. This latest acknowledgement by the DiBT (Deutsches Institut für Bautechnik) means that Exova Warringtonfire Frankfurt – which is accredited according to DIN EN ISO/IEC 17025 – is able to work more closely with the construction sector in testing building materials and specialist building components for their reaction to fire. It is now the only specialist fire testing laboratory in Germany that is fully accredited and acknowledged for every test it undertakes.

The facility is currently undergoing a programme of extending and broadening its test service offerings alongside the company's other facilities worldwide.

For more information, go to www.exova.com

How Do You Spell "Quality"?

The RectorSeal Corporation has over 75 years of experience as a manufacturer of specialty chemicals for professional contractors in all facets of the construction industry. A company cannot remain a leader in the industry for this many years without producing products of the highest quality and performance.

To measure quality, we first start with a great team of people. Talented, united and dedicated to the production of some of the finest products in our industry. Our chemists have developed innovative and effective formulations to address all your firestop needs.

RectorSeal's line of Firestop Products are distributed, sold and used worldwide under two trade names, Metacaulk and Bio-Fireshield. Whether the project is a high-rise office complex, a hospital, an airport, a hotel or a high-tech industrial complex designers, architects, engineers and building officials around the world have grown to trust and depend on the RectorSeal name for quality firestops.

RectorSeal also operates and maintains a complete fire test laboratory recognized by Underwriters Laboratories (UL) under the auspices of their Witness Test Program. Here at our lab, new products and applications are tested, optimized and approved for listings in a constant effort to promote the highest standards of Life-Safety. As new and advanced building materials and techniques are introduced for use on the latest projects, RectorSeal has the ability to develop, test and offer quality solutions to maintain the fire integrity of the building components. Our continuous commitment to testing during the past two decades has resulted in over 2,000 listings with UL as well as listings with Factory Mutual (FM) and Intertek (Warnock Hersey). Our Firestop Products have also been tested and approved for use in many other countries as well as meeting the British and Australian Test Standards. Most importantly, our Firestop Products meet all of the strict requirements of the family of International Building Codes which are continuing to be adopted by an ever increasing number of nations worldwide.

What does Quality mean and how can it be measured? It is obvious, products must be able to perform during a fire scenario in order to reestablish and maintain the fire integrity of the rated assembly. But more than this, a true quality material must be able to perform to the highest degree before the fire strikes. Most of RectorSeal's firestop products are able to withstand storage temperature of up to 49°C and can endure multiple freeze-thaw cycles and still be suitable for use.

In fact, because of our long history of manufacturing , our use of the finest raw materials and our superior formulations we have recently increased the useable shelf-life of our water-based firestop caulks from 2-years to a minimum of 3-years, subject to inspection and when properly stored in unopened containers. Lastly, because of this quality and the extreme performance and confidence in our firestop products we now offer a product performance warranty for the Life of the building.

In short, RectorSeal's firestops deliver:

- High storage temperatures
- Long shelf-life
- Excellent freeze-thaw
- Performance for the life of the building

So, how do you spell Quality? The answer, "RECTORSEAL". IFP

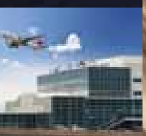
For more information, go to www.rectorseal.com

RECTORSEAL

EXCEEDING INTERNATIONAL BUILDING CODE REQUIREMENTS

metacaulk®

FIRESTOP SOLUTIONS



- Longest Shelf Life
- Freeze-Thaw Capabilities
- Highest Storage Temperature
- LEED Compliant

Metacaulk® Firestopping Products.

Worldwide Accreditation and IBC Compliant.

An increasing number of countries are demanding local construction projects be designed and built to meet the International Building Code (IBC). With more projects and industries being designed internationally to meet the high standards of IBC, firestopping has become a global issue. Metacaulk's full line of firestopping products comply with the IBC family of codes and are designed to offer economical solutions for all firestop applications from light commercial to the mega-projects. All Metacaulk products are superior in quality offering a guarantee on product performance for the life of the building.

IWMA Paris Conference Review

In October, the 13th International Water Mist Conference took place in Paris. 80 delegates from 19 nations – quite a few from overseas countries such as Australia, the USA and Japan – travelled to the French Capital to join the world's water mist community to network, talk and hear about the latest developments with the industry.

During the two day conference – which had been organized by the International Water Mist Association (IWMA) – 20 speakers from around the globe gave 20 high-quality presentations. As always, the long-standing chairman of the association, Ragnar Wighus (Sintef, Norway), gave the opening speech and reported on the state-of-the-art of water mist technology. Afterwards Marco Pesaola (Eusebi Impianti, Italy) talked about new water mist solutions according to annex B of CEN TS 14972, and Luciano Nigro (Marioff Italy) gave a presentation on the status of the standardisation of water mist systems.

Seven lectures were held in the category "research and testing". Among the speakers here were CSTB's Elizabeth Blanchard, Louise Jackman (BRE, UK), Jukka Vaari (VTT, Finland) and the chairman of the IWMA's scientific council Hong-Zeng (Bert) Yu (FM Global, USA). Blanchard talked about smoke layer and water spray interaction; Jackman's topic was the water mist protection of domestic and residential occupancies; Vaari's presentation was entitled "experimental characterisation and CFD modelling of high-pressure water mist spray". Finally, Yu spoke about a fire test protocol for off-road vehicle fire extinguishing systems.

Additionally, a number of speakers presented papers on water mist applications. Rüdiger Kopp (Fogtec Fire Protection, Germany) explained how his company had increased fire safety within Cologne Main Station with high-pressure water mist. Márton Horváth (Tüzör, Hungary) opened up the secrets of smoke extraction and high-pressure water mist in the Hungarian Parliament in Budapest. Christophe Balayre (Danfoss Semco, Denmark) spoke about the protection of data

For more information, go to www.iwma.net

centres, and Stuart Lloyd (Zurich Insurance, UK) went into the details of industrial oil cooker protection from the insurance point of view.

Ingrid Staurheim (KA Association for Employers in the Church of Norway and Church-Related NGOs) talked about a very particular problem. In her home country most churches are built of wood and, once in a while – and for many years – arsonists have set fire to these old heritage buildings. Hence, the subject of her lecture was the protection of wooden churches with water-based firefighting systems. These and all other lectures are available on the IWMA's webpage.

On the evening of the first day of the conference the IWMA invited all members, speakers and attendees to a reception to give everybody the chance for extensive discussions. Simultaneously the sponsoring companies – Aquasys, Danfoss Semco, FM Approvals, Fogtec, Marioff, Novenco, UltraFog and VID Fire-Kill – had the chance to make presentations and exhibit their products.

On day two of the conference, Wighus announced the date and venue for next year's International Water Mist Conference; the 22nd and 23rd October in Istanbul, Turkey. After this year's successful IWMA seminar in Dubai – held during Intersec 2013 – it became clear that water mist is an extremely interesting topic for Asia and particularly the Middle East with its limited water resources. So it stands to reason that the IWMA and its annual conference should move closer to this region. And what city could be more a better choice that Istanbul – the only city in the world that stands on two continents: Europe and Asia? IFP

Maltese Holiday Resort's Safety Solution

HOCHIKI EUROPE has supplied a BS 5839 compliant category L1 addressable system as part of an extensive refurbishment of the Seabank Resort & Spa, one of Malta's few all-inclusive holiday locations with facilities that include five themed restaurants, three bars, Malta's largest hotel swimming pool, and a wellness spa with heated panoramic indoor pool. It has 1,700 beds and 130 on-site staff.

The fire detection system is based around the company's Enhanced Systems Protocol (ESP) – a robust total communications solution for intelligent fire detection and fully integrated systems. It has a multi-purpose structure that provides the flexibility and expansion to accommodate simple addressable systems through to integrated building management and safety systems.

A wide variety of devices have been used, including 1,184 ALG-EN smoke sensors, which feature the company's high performance chamber technology, 193 ACB-E heat sensors and 83 HCP-E manual call points, along with other devices such as dual relay modules, mains relay controllers, mini zone monitors and smoke reflective beams.

BS 5839 specifies that in areas where people are sleeping the sounder level needs to be 75dB at the bed-head. To meet this requirement 631 base sounders were used along with 23 combined base sounder beacons in specific areas where an additional visual warning was considered necessary to alert occupants.

For more information, go to www.hochikieurope.com

Multiple Attack Glass Test Success

SCHOTT has announced that a variety of its special glass laminates have been successfully tested against simultaneous multiple attacks, with the claim that this is the world's first special glass products that successfully withstand simultaneous fire and ballistic attacks.

The glass products from the German-based company's Pyranova secure and the Novolay secure series were subjected to a fire test and bullet attack immediately after one another. The test results were monitored and confirmed by the Beschussamt Ulm ballistic test facility in Ulm and the Institute for Building Materials, Solid Construction and Fire Protection (IBMB) at the Technical University of Braunschweig. The glasses met both of the test standards DIN EN 357 (Fire Protection) and DIN EN 1063 (Bullet Resistance).

For more information, go to www.schott.com

FIA Guidance

Britain's FIRE INDUSTRY ASSOCIATION (FIA) has published a white paper entitled *"Third Party Certification: What does it mean for Businesses?"* in an effort to make third-party certification easier for fire protection suppliers to understand.

The FIA argues that by using third-party certification, businesses are making themselves much more attractive to potential customers, particularly where they are required by law to ensure they use competent suppliers.

The white paper is divided into five main sections. It explains that third-party certification is, in essence, a consumer protection scheme; it details the advantages a company can get by attaining third-party certification, and explains how the certification process is carried out and how often it has to be repeated. The white paper goes on to clarify who produces the schemes, what areas they cover and what the main differences are between them. It also sets out what help the FIA can provide for members and non-members who want to achieve third-party certification.

In an effort to make fire safety and notices more easily understood to both the fire trade and members of the public, the Fire Industry Association has also released a new Guidance Document on fire safety signs and notices. This Guide has been introduced to help building managers, facility managers, duty holders, responsible persons and FIA members understand what is required and gives examples of what signs should be used. The Guide points out that fire safety signs should be reviewed periodically to ensure they continue to support the fire safety strategy for the premises.

For more information, go to www.fia.uk.com

New EN54-11 Approved Call Point

The new in-house designed and manufactured collection of EN54-11:2001 compliant manual call points from APOLLO is available in XP95, Discovery and Waterproof variants and feature a re-settable element for quick and easy testing where a single ergonomically-designed tool is used for both the test and reset procedures. Installation is further eased with front-facing addressing, meaning there is no need to detach it from the back-box, which is supplied as standard for simple surface mounting.

The products are also loop-powered and feature 'E-Z fit' connectors to reduce and speed-up wiring requirements, and have a continuity link to allow system wiring and testing prior to call point connection. Customers can choose to have an isolator included with the manual call points, which would eliminate the need for additional, separate isolation devices. These isolator versions are also EN54-17 compliant. A two-colour LED on the front clearly displays 'normal' or 'fault' status for each device, and the highly visible alarm indicator can be seen from up to ten metres away. The new call points are fully backwards compatible and can be retro-fitted. They can also be supplied with an optional transparent cover to prevent accidental operation.

For more information, go to www.apollo-fire.co.uk

Pendent Sprinkler Approval

TYCO FIRE PROTECTION PRODUCTS has received FM Approval for its Model ESFR-17 dry-type, early suppression, fast response, pendent sprinkler. The FM Approval for the 74 degree sprinkler is in addition to the existing UL Listing for use in wet pipe systems protecting cold storage facilities where the system piping is installed in a heated space above the freezer area. In these applications, the sprinkler can reduce the installed cost of a fire sprinkler system by providing ceiling-only protection, without the costs and maintenance associated with a dry or pre-action system or the risk of sprinkler-head damage associated with in-rack sprinklers.

For more information, go to www.tfppemea.com

Testing Smoke Detectors

No access, No variations, No excuses

Many buildings require smoke detection in areas that are difficult to access, but are vital to ensure the safety of the building and its occupants. They are found in the most common of places – in lift shafts, at the top of atria, or in the void space above ceilings. They are also found in buildings that are in 24/7 use such as airport terminals, factories and warehouses, academia, and hospitals. In these environments, it is estimated that up to 10 percent of detectors are never tested, and yet these detectors are often those that are most critical to function.

With Scorpion, all smoke detectors in a building can now be safely and efficiently tested every year.

Testing these point detectors or ASD systems often carries a disproportionate time and cost. Current test methods often mean:

- Health and safety risk assessments and approval.
- Restricting access that disrupts the normal operation of the building.
- Bringing in access equipment (hire cost, possible damage to building or floor tiles).
- Risk of dislodging or damaging cables, fittings and lights.
- At least two staff members able/trained to work at height or in restricted spaces, or lift engineers to shut down the lifts.
- Out of hours working (evening or weekends), which increases staff costs.

With ASD systems, industry-accepted test methods involve over-heating cables to give off smoke (wire-burn test) or setting fire to different materials (lactose or wood, for example). These present health and safety risks and need the area to be cleared of personnel until the smoke has dissipated.

Scorpion is a new way of bringing these difficult-to-access detectors into reach and enables them to finally be tested. The Scorpion system consists of a smoke-generator that is mounted alongside a point detector or next to the furthest sampling hole on an ASD pipe. The smoke generating head unit is then cabled back to a Scorpion control panel that is mounted at a convenient, easy to reach, location. Testing of the "hard to access" detector is now as simple as selecting the appropriate head unit and pressing the "start" button on the control panel.

Smoke is generated right where it is needed – in the immediate vicinity of the point detector or ASD sampling hole. This enables a functional smoke test to be conducted safely and quickly, meaning there is no disruption to the normal working of the building. Scorpion also provides the ability to measure transport time for ASD systems with greater consistency from one maintenance visit to the next.

Scorpion is already proving its worth in a number of sites across Europe, ranging from university archives and sports halls, lift shafts and void spaces, to warehouses and computer server rooms. One such example is the archive at the University of Leeds in England. The secure archive is covered by five ASD pipes that now have Scorpion heads mounted at the furthest accessible sampling hole. The control panel is outside the secure area from where the test of the complete system can be run.

Scorpion brings difficult-to-access detectors into reach. It comprises a smoke-generator mounted alongside a point detector or next to the furthest sampling hole on an ASD pipe.

Althuisius Warehousing in The Netherlands is another example where maintaining the fire system to the highest standards is of paramount importance. The ASD pipes in the warehouse are 15 metres from the floor. After the initial installation, Scorpion eliminated the need for specialist access equipment, and allowed a full test of the pipe integrity to be carried out from ground level. The whole fire detection system is tested every month, with alarm activation and system clearing being considerably quicker than traditional test methods.

Testing time is reduced to minutes rather than hours, and access equipment and additional staff costs are eliminated. The fire system is fully tested and compliant with codes, standards, and regulations. Scorpion means variations to the maintenance schedule are now un-necessary, as all smoke detectors can be functionally tested easily and safely. IFP

For more information, go to www.scorpion-tester.com


Out of sight - Out of mind?
- but difficult-to-access smoke detectors still need to be tested!
Now there's a way with Scorpion
Remote functional testing for Point & ASD Systems
Sales office
Reception
Warehouse
Lift shafts
Main atrium
IT Server Room
Meeting Room
detectortesters
testing technology from No Climb
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www.scorpion-tester.com


FAAST
FIRE ALARM ASPIRATION SENSING TECHNOLOGY
Mission Critical Aspiration Detection
● No false alarms
● No business disruption
● Earliest warning detection
The world's first web & IP enabled aspiration device enables remote monitoring from any location.
With ultra sensitive detection to EN54-20 Class A and immunity to false alarm risks, you can support your end user uptime goals.
To find out more visit www.faast-detection.com
SYSTEM SENSOR

Protectowire's FiberSystem 8000

Fiber Optic Linear Heat Detection for Special Hazard Applications

In today's complex industrial environments, the potential for downtime and financial losses caused by overheating and fire can be disastrous if not detected and located quickly. That is why Protectowire's linear heat and fire detection systems are the first choice of many design professionals. Our new FiberSystem 8000 is based upon today's most advanced technology in the field of fiber optic temperature measuring techniques and incorporates many unique and specifiable features not available on competitive systems.

The Protectowire FiberSystem 8000 measures temperatures by means of optical fibers functioning as linear sensors. Temperatures are recorded along the sensor cable as a continuous profile. This ensures high accuracy of temperature discrimination over great distances or large surfaces, while reducing measuring times. The sensor cable contains no electronics and is therefore immune to electromagnetic disturbances of all kinds.

Like all Protectowire linear heat detection systems, the FiberSystem 8000 will provide an exact location of the fire or hot spot anywhere along the sensor's length and features:

- **Unique Zoning Capabilities**
  A single length of sensor can be partitioned into different segments (zones) for various requirements, for example, video, ventilation, and extinguishment. Zones can be defined as desired and even overlapped, increasing system control capabilities.
- **Multiple Alarm Initiating Criteria by Zone**
  Alarm initiation may be based on a maximum temperature for each zone, temperature development for each zone in terms of time, or temperature difference between a measurement location and the zone's average temperature.
- **Capable of Providing Visualization of the Fire Size, Based on the Length of Sensor in Alarm**
- **Capable of Determining the Direction of Fire Spread**
  Most fires have a dominant direction of spread. Knowing this direction of spread, the intervention forces can direct their attack to the less dangerous side of the fire.
- **Available 2 or 4 Channel Operation**
  All FiberSystem 8000 multi-channel controllers are configured to operate in a single end mode or multi-channel closed loop mode. In a multi-channel single end configuration, the controller performs single ended measurements on two or four separate fibers, depending on model, thus providing multiple detection "channels" or areas of coverage. In the multi-channel closed loop operating mode, the sensor cable is installed in a loop, and the controller performs measurements from both ends of the fiber. Should a break in the fiber occur, the entire sensor cable length continues to be monitored from both directions up to the point of the break thus providing complete detection coverage.

Enhanced User Interface Capabilities

The Controller is provided with four optically decoupled inputs and forty four voltage free outputs for status reporting to a main fire alarm panel. The system can be integrated easily into your management platform (for example, SCADA systems) by either directly communicating over Ethernet (TCP/IP) using SCPI (Standard Commands for Programmable Interface), or Modbus RS232, RS422, RS485 and TCP/IP.

The configuration software is the heart of the new Protectowire FiberSystem 8000. It provides an easy to use graphical computer interface to the PTS Controller and can be used as the basic application for calibrating the sensor, creating configurations, creating measurement sequences, starting measurements, and viewing traces. The software makes it possible to create multiple zones along a single length of sensor cable, determine the direction of fire spread, provide visualization of the fire size based upon the length of sensor in alarm and configure zone related alarm generated outputs for event handling.

The Protectowire Company is dedicated to providing products designed, engineered, and manufactured with the highest degree of quality and reliability. This is demonstrated by 75 years of excellence within the fire protection community. We are an ISO 9001 Registered Company and hold other specific approvals and patents around the world. IFP

For more information, go to www.protectowire.com

New Luminaire Recess Adaptor

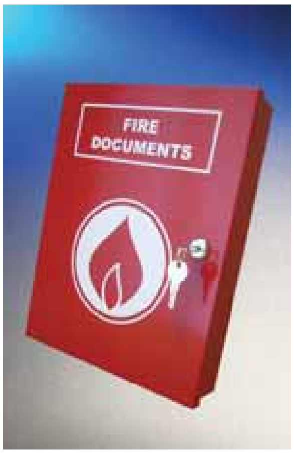
HOCHIKI EUROPE has added a recess adaptor to its FIREscape range of emergency lighting luminaires, allowing either of the two currently available FIREscape luminaires (corridor and open area) to be mounted flush with the ceiling material. The adaptor will also fit the new high-output luminaires coming to market in early 2014.

The unit comes equipped with a mounting base that includes spring-loaded clips, enabling the luminaire to be sited within celling voids through materials up to 25mm thick. Also available are new recess adaptors developed for the FIREscape exit signs.

The FIREscape system is a low-voltage, intelligent LED emergency lighting system that utilises ESP protocol, first developed for the company's fire detection systems.

For more information, go to www.hochikieurope.com/firescape

New Fire Document Box



ELMDENE has launched of a lockable, A4 size, fire document box to be used in conjunction with a building's fire alarm system to provide a convenient, wall-mounted, enclosure so that relevant log books, manuals and other important documentation can be kept safe until they are actually needed.

Made from robust 1.2mm powder-coated steel the low-profile box comes with two keys and features the distinctive red branding associated with fire applications plus a screen-printed white 'fire' logo.

For more information, go to www.elmdene.co.uk

Distribution Centre's ASD Fire Protection

WAGNER UK's Titanus Pro-Sens air sampling smoke detection (ASD) systems have been chosen for Tesco's latest 46,500 square metre distribution centre in Dagenham in the UK, with the aim of ensuring rapid response to a fire condition, protecting staff and the valuable logistics operation for the supermarket chain.

A total of 24 Pro-Sens units were installed in a 1°C and a 12°C cold store and a separate recycling plant. The systems draw air samples continuously from the monitored area through a pipe system fitted with sampling holes at regular intervals. The airflow is then analysed for smoke particles and an alarm is raised if smoke is present. The Titanus ASD detection module uses a high-power LED light source as opposed to a conventional laser, providing additional benefits including the ability to operate down to minus 40°C.

The Titanus range is supported by PipeXpress, Wagner's system design tool, which ensures the pipe network delivers equal performance across the whole monitoring area. The system was installed and commissioned in accordance with the manufacturer's recommendations and BS 5839-1.

For more information, go to www.wagner-uk.com

Explosion-proof Sounders Offering Expanded

E2S has introduced a new option for its BEx range of explosion proof sounders. A new design of output horn turns the sound 90 degrees into a radial, omni-directional pattern without reducing the unit's sound output levels. This is particularly suited to combined sounder/beacon units that are normally installed with the beacon at the top and the horn facing downwards so that the sound output is pointing directly at the floor, limiting its range and impact. In addition to improving the effectiveness of the BEx combined units, the radial horn offers a smaller footprint than the directional unit, allowing the units to be installed in locations where space is restricted.

The new "-R" version can be specified for all existing BEx sounders and combination units. The four-stage, 45 tone BEx range is available in both EEx d and EEx de ratings, and is approved for use in gas Zones 1 and 2 and dust Zones 21 and 22. The range consists of 117 dB at one metre and 123 dB at one metre sounders, Hootronic versions that faithfully mimic the traditional electromechanical siren, buzzer and bell, 15 Watt and 25 Watt loudspeakers and five, 10, 15 and 21 Joule beacons.

For more information, go to www.e2s.com/product-search?product=radial+horn

SP Unveils P-Mark Certificate

In cooperation with international stakeholders, SP TECHNICAL RESEARCH INSTITUTE OF SWEDEN has published a new fire test standard – SP method 4912 – for fire suppression systems in engine compartments of buses and coaches. As a further extinguishment system quality assurance, SP has also established a voluntary certification and quality mark – the P-mark – according to SPCR 183 (SP Certification Rules).

Several companies are at present running tests at SP in order to obtain the P-mark and recently the first issued P-mark certificate in accordance with SPCR 183 was published at: http://www.sp.se/safebus/certified, where future issued certificates also will be published.

A fire suppression system tested in accordance with SP method 4912 shows its functionality against realistic bus engine fires. A P-marked system, tested in accordance to SPCR 183, further demonstrates a high degree of robustness as it is also tested for resistance to harsh environments in internationally accepted vehicle standards. Quality assurance and control over time is maintained through an independent, approved auditor that reviews factory production control.

For more information, go to www.sp.se/safebus

PROFILE

Fire-stopping Cables in Large Openings

When thinking of fire-stopping, often the first idea that comes to mind is red caulk applied into an opening to seal voids, effectively restricting the passage of fire and smoke. For most basic penetrations in typical building construction, firestop caulks offers a quick and economical solution. However, the challenge is the design and installation of a firestop solution for cables found in large openings. Large openings are not uncommon; often found in older buildings, healthcare, and modern industrial facilities, they can represent new or retrofit conditions. A variety of penetrants are frequently present in the same opening, adding to the challenge.

Fire-stopping of cables, whether singularly or with other penetrants, is an important topic to understand. Unlike a building's electrical system that changes little during the buildings life, or pipes and conduits that normally do not see any change, data cable changes and upgrades are more frequent. As an example, a data signal that once required Category 3 cable now must travel through Category 6 or 6A cable. Another example is the replacement of copper cables in favour of fibre advanced optics. It is no wonder that data cabling accounts for the majority of fire-stopping issues in buildings today.

So, how does one achieve an effective firestop in these large openings that also satisfy a building's changing needs? How is this accomplished when some penetrants in the opening do not change while others may see frequent change? More importantly, what steps can be taken to ensure the firestop is replaced properly maintaining the safety of the building and adhering to building code requirements? The answer is in the selection of the firestop products and keeping future changes in mind.

Today's firestop market offers a wide range of product types. Some are intended to be more permanent in nature. Firestop sealants fall into this category. Retrofittable products are designed to be easily removed and reinstalled to facilitate a cable change or add, and reinstalled without the need for fresh product. For larger openings, a product such as SpecSeal firestop pillows would be a good choice. Pillows offer fast, simple and easy installation often requiring only one pillow to be removed and reinstalled to accommodate the change.

Firestop products specifically designed to allow quick and safe changes of cable systems are available. The best known and only reliable one is called EZ-Path. It is the only one that incorporates a self-adjusting and self-sealing firestop system accommodating 0% to 100% cable fill while allowing complete freedom of cable changes or additions without having to remove or add any material. EZ-Path is a zero maintenance firestop solution where multiple devices can be ganged to provide present capacity as well as capacity for future use. Additionally, cable organization and identification is easy and there is no need to activate the device to maintain fire or smoke control performance. EZ-Path is quickly becoming the standard product used for running low-voltage cabling in North America.

In large openings, penetrant installations that are more permanent are often mixed with cables that see frequent changes and additions. For these, combining a retrofittable firestop product with SpecSeal composite sheet is a great alternative. SpecSeal composite sheet consists of sheet steel with an intumescent coating on one side. It is stronger, thinner, lighter and easier to cut than any similar product on the market; it allows large openings to be fire-stopped quickly, and when combined with EZ-Path, ensures portions of the opening remain easily retrofittable and code compliant.

Composite sheet provides a solution to firestop portions of the opening that are more permanent in nature while allowing the incorporation of EZ-Path for retrofittability of cables. Given that EZ-Path requires no activation and is self-sealing and self-adjusting, the firestop solution will remain code compliant even after changes to the cable system are made.

Simple to install, easy to maintain, always compliant; managing fire-stopped cables in large openings used to be a large problem . . . that problem has been largely solved. IFP

For more information, go to www.stifirestop.com

Fulleon's LX Range – Fully Certified & Available Today

Visual alarm beacons are increasingly used throughout buildings for fire, industrial and various other processes where a means of visually drawing attention is necessary. Most commonly, this is to alert the hard-of-hearing or to communicate and alert people in areas of high ambient noise. Increasingly they are seen as a way of mitigating risk, by automating a visual method of raising an alarm.

January 2014 sees the introduction of EN 54-23, a new standard for fire alarm beacons. All beacons manufactured for fire alarm use and sold for fire alarm applications in the EU after this date, must be CE certified using the new standard.

EN 54-23 Solution Available Today

To meet the exacting demands of this new standard, Eaton's Fulleon business has launched the first fully certified range designed exclusively for the fire market. Available now, the LX Range provides fully certified visual alarm devices (VADs) to EN 54-23. The range comprises a wall category and ceiling category beacon, a low current sounder, a low current IP66 sounder beacon and a RoLP sounder beacon, which is fully compatible with all existing RoLP sounders.

Maximum Coverage, Minimum Consumption

The LX range was developed to provide the lowest possible current consumption while still giving the highest possible light output, so as to maximise the number of devices on a circuit.

The range centres on patented lens technology that manages the distribution of light with extraordinary efficiency. Any light outside of the volume prescribed in EN 54-23 is a waste of power; the LX lens refracts light to remove hot spots directly in front of the LED before re-distributing the light to illuminate dark spots. This method delivers the intensity of light required while minimising current consumption.

Low Power & Flexibility

All products in the LX range have two room size settings; 7.5 metres for larger spaces, down to 2.5 metres for smaller areas. The flash rate can be set at 1Hz or 0.5Hz. The 7.5-metre coverage setting at 0.5Hz is 16mA, switch to a 2.5-metre wall setting and the current consumption drops to a market-leading 10mA.

The settings allow each device to meet the unique requirements of each specific area, and to manage power consumption in the most efficient manner. As well as providing flexibility, it also helps simplify stock management and reduces stock holding.

Flash

EN 54-23 allows for either a red or a white flash. In many parts of Europe a red flash is synonymous with fire. To develop a red flash option that achieves the required 0.4 lux specified by EN 54-23, without compromising the current consumption, is extremely challenging. With the LX range, this has been achieved; both the red and white flash options consume 16mA when set to 0.5 Hz and a room setting of 7.5 metres. All LX products are available in either a red or white flash.

Specifying

The FIA (Fire Industry Association) and LPCB (Loss Prevention Certification Board) have produced a Code of Practice, CoP0001, to help system designers specify the placement of visual alarm devices. In the recent update to BS5839-1 2013, CoP0001 is referenced, where the use of alarm beacons is chosen as a solution to a risk assessment.

Eaton's Fulleon business aims to make the transition to meet the new requirements as simple as possible. An online specification tool for the LX range has been developed, which will identify how many devices are required and their combined current consumption for a given area. The tool allows the user to quickly assess the impact of changing the flash rate and the type of product selected.

A 20-page pocket guide to help with the planning, installation, commissioning and maintenance of VADs has also been created. These tools, certificates and additional details are also available online. IFP

For more information, go to www.cooperfulleon.com

The Fire Pump – The Critical Component

David Gentle

SPP Pumps

The increasing use of sprinkler systems around the world, and particularly the growing number of challenging structures in which they are being installed has meant that the quality, performance and reliability of pumps and pump-related equipment has taken on critical importance.

A fire pump is an essential part of a fire sprinkler system's water supply and is required when the local municipal water system cannot provide sufficient pressure – or equally important, be relied upon to provide the pressure – to meet the hydraulic design requirements of the sprinkler system. This particularly is the case in high-rise buildings or in systems that require a relatively high terminal pressure at the fire sprinkler in order to provide a large volume of water. An example of this type of structure is the mega-size storage warehouses and distribution centres that are today commonplace around the world. Indeed, sprinkler systems can be found in a wide array of buildings, including: multi-storey offices; hospitals; airports; manufacturing facilities; power stations; pharmaceutical facilities; and schools, colleges and universities.

In addition to sprinkler systems, typical applications include: hydrant systems that enable firefighters to tap into the municipal water supply; deluge systems that bring a large number of open sprayers into action simultaneously in the event of a fire; fixed firefighting foam and water monitor systems; and water curtain installations, which are similar to deluge systems except that they deliver a "curtain" or "sheet" of water.

A fire pump can be electric or diesel powered and is connected to either the public underground water supply piping or a sufficient static water source such as a tank, reservoir or lake. The principal of operation is that the pump provides water flow at a higher pressure to the sprinkler system risers and hose standpipes. They are tested and listed for their use for fire applications and should be accredited by a reputable third-party testing and listing agency, such as UL (Underwriters Laboratories), FM (Factory Mutual) Global or LPCB (Loss Prevention Certification Board). The main code that governs fire pump installations in North America and many other parts of the world is the 2013 edition of the NFPA's (National Fire Protection Association) NFPA 20 *Standard for the Installation of Stationary Fire Pumps for Fire*

Protection. Other approvals include CNPP (APSAD) (Le Centre national de prévention et de protection), CNBOP (Centrum Naukowo-Badawcze Ochrony Przeciwpo arowej), ZÚS (Technický a Zkušební Ústav Stavební) and TÜV SÜD PSB (Singapore Productivity and Standards Board).

by vertical electric motors or by diesel engines through a right-angle gearbox. These pumps are designed to also fit in a bore-hole well, open reservoir, river or tank. Typically, they are available for duties ranging from around 950 litres-a-minute to 19,000 litres-a-minute.

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Pump Options

There are several types of fire pump on the market, each designed for a particular purpose:

- **Split Case Pumps**
  Split case pumps are a type of centrifugal pump that has a single double-suction or two single-suction impellers supported between bearings. The casing is axially split for easy maintenance and the suction and discharge flanges are opposed to each other. Typically, they are available for duties ranging from around 760 litres-a-minute to 19,000 litres-a-minute and are suitable for electric or diesel drives.
- **Vertical Turbine Pumps**
  A vertical suspended multi-stage turbine pump is the best pumping solution where the water source is located below the prevailing ground or deck level. With this type of pump the impellers are fully immersed in the water, maintaining prime at all times. The pumps are driven
- **End Suction Pumps**
  The end suction pump is the most common type of centrifugal pump. It has a horizontal shaft with an overhung impeller. The water flow goes in the end of the casing, and out the top. They are typically available for duties ranging from around 760 litres-a-minute to 5,700 litres-a-minute and are suitable for electric or diesel drives.
- **Vertical In-line Pumps**
  Vertical in-line fire pumps are lightweight and compact so they are ideal for smaller pump rooms for duties up to 2,800 litres-a-minute. They eliminate the need for coupling alignment and there are fewer lost or misplaced parts. They are suitable for electric drives.
- **Multi-stage Multi-outlet Pumps**
  A multi-stage pump uses multiple impellers to generate more head than a single stage (single impeller) pump. They are available in horizontal

Pumps Protect Europe's Tallest Building

SPP PUMPS has supplied fire safety pump sets for the Shard, a recent addition to the London Bridge quarter in the UK; at 309.6 metres, acknowledged as the tallest building in Europe.

The design of water supplies for such a high building presented a unique challenge, calling for sprinkler and wet riser pumps that have been subjected to the stringent performance and reliability tests of specialist fire approval laboratories worldwide. European sprinkler regulations do not allow the use of pressure reducing valves due to their unreliability, so zones had to be created to limit the pressure on the sprinkler heads in lieu of the valves.

This concept had never previously been applied to a building over 300 metres and SPP worked with the consultant, Arup, to create a solution that produced a quality, reliable water source that satisfied the challenging regulations. For the sprinkler pumps, SPP supplied two CD12K ten-stage pumps with seven take-off outlets to supply seven sprinkler zones in the building. The pumps were driven by 200kW motors. Each zone has its own jockey pump to maintain the pressure.

Three other pump stations were installed at various levels in the building. At base level SPP supplied two BU06 split case pumps with 315kW motors to produce 4,500 litres-a-minute at 24 Bar. The mid- and high-level pump houses were equipped with CD10K four-stage pumps with 132kW motors producing 3,000 litres-a-minute at 24bar.

and vertical orientations. Multi-stage multi-outlet pumps can be found in most types of tall buildings, in particular in offices, hospitals and hotels. They offer a number of major benefits including: the need for fewer pumps; reduced pipe work and valves; no need for water storage tanks on intermediate floors; lower loading on the building structure, and hence lower cost of construction; and better utilisation of expensive floor space.

The cost and space-saving benefits in high-rise buildings are considerable, where the number of outlets on different floors along its length can deliver water to the various levels at the required lower and higher pressures. Typical examples are the Shard building – at 309.6 metres, acknowledged as the tallest building in Europe – and the Swiss Re "Gherkin" building, which was London's first environmentally sustainable tall building, and Wheelock Place in Singapore.

Electric motor or diesel engine-driven multi stage multi outlet pumps are available to meet the technical bulletins for automatic sprinkler protection of high-rise and multiple storey buildings issued by the LPC.

Pump House Packages

So-called pump house packages have come to the fore in the past few decades whereby a complete fire protection packages is provided from a single source in a single container incorporating pumps, control systems and all pipework. These integrated units are delivered complete and can be operational immediately after connecting the water and power supplies on site.

There are several key advantages to the packaged approached, which SPP pioneered as far back as the 1970s. These include: ease of site connection, which saves time and on-site labour cost as well as avoiding the possibility of incorrect installation; plus the equipment is designed to meet the necessary fire protection rules and is installed in standard size containers for delivery without the need for a police escort. Additionally, the entire solution is built and assembled in a clean, controlled factory environment to the highest engineering and quality standards; it is fully tested and pre-commissioned using advanced computerised testing facilities; and the package can be tailored to the precise requirements of the customer. Other benefits include: containerised CAD design reduces the need for valuable floor space; and wall insulation reduces noise levels. Single responsibility for the complete pump house also eliminates site coordination problems and the possibility of miss-matched components

Another example of these packages is SPP Pumps' vertical in-line pumps that frequently form part of a pre-wired package that include a limited or full service controller. Every package is mounted on a steel fabricated base with the motor wired to the controller. The automatic air relief valve, casing relief valve, suction gauge and discharge gauge are mounted on their respective spool pieces, and the package also includes a jockey pump and jockey pump controller. Additional piping, valves and sensing lines can be incorporated.

Servicing & Maintenance

Maintenance and servicing are absolutely critical, and they are most certainly not tick-box exercises. The work has to thoroughly and professionally

carried out because a fire is not when you want to discover that your pump has become the weak link in the sprinkler discharge chain. It is a chilling thought that, even with all of the weekly checks being carried out correctly, it still guarantees that the fire pump is working for only 0.3 percent of the week.

A fire pump is designed for intermittent running with bearings designed to run over their life time in excess of thousands of hours, the impellers are well balanced and it has the ability to go from stand-still to full load within seconds. The idea is for it to run and run with the sole purpose of putting out a fire, not failing safe for any reason.

Ensuring that a fire pump is constantly available to deliver 100 percent performance has taken a major step forward in recent years with the introduction of remote monitoring that provides SMS warning messages and emails of system events. This covers a host of eventualities such as low fuel level, battery failure and the system being left off-line.

In the case of SPP's FireEye remote monitoring system, a web portal is available from any Internet-connected computer or smart phone anywhere in the world. It allows users to check the status of any measured parameter on the fire pump system without having to drive to the site. This again can reduce, if not eliminate, call-out visits and associated service costs thereby increasing efficiency and saving money. FireEye can be retrofitted to any electric or diesel-driven fire pump system giving the ability to pre-empt potential equipment failures and to warn of adverse operating conditions.

There is, of course, another aspect to servicing that buyers ought to take into account before making the final purchase decision, and that is the local availability of product support, service and replacement parts. Fate has a nasty way of getting the better of us sometimes and it is not unheard of for a fire to break out just when the sprinkler system is down. So, waiting around for a part to be shipped across the world or having an engineer unfamiliar with a particular pump fumbling to get it working is not a viable or wise option.

Which leads on to the subject of product approvals. The major manufacturers invest heavily in certifying and approving their pumps, but if you are offered a pump with an unfamiliar pedigree, it is wise not to take at face value any claims of complying with standards or having obtained third-party certification. Check directly with the approving or certification body. IFP

There are several key advantages to pump house packages, including ease of site connection, plus the equipment is designed to meet the necessary fire protection rules and is installed in standard size containers for delivery without the need for a police escort.

David Gentle is Business Development Manager at SPP Pumps

For further information, go to www.spppumps.com

How 9/11 Affected

F E Moran

On September 11, 2001, 3,000 people died in the 9/11 attacks that shook the USA, indeed the world, through an array of coordinated attacks at the World Trade Centre, Pentagon, and the airliner that crashed in Shanksville, Pennsylvania. This terrible event was an important day for the NFPA. Due to the fires, mass communication, and building issues that led to the immense death toll, NFPA developed codes and expanded and/or refined existing codes to avoid future tragedies.

To millions across the USA, September 11, 2001 appeared to be an average Tuesday, until 8:46am when flight 11, the first of several hijacked planes, crashed into the north tower of the World Trade Centre. Chief of the New York City Fire Department's 1st Battalion, Joseph Pfeifer was the first to alert the fire department of the crash. He was only a few blocks away, investigating a gas leak when the plane crashed. Between 8:48am and 10:28am, over one hundred people who were trapped on the upper levels of the tower jumped to their deaths.

Within three minutes, network media picked up the story and began informing the public of a plane crash. However, it was not until 9:28am that the media began speculating about foul play being involved, first reported by CNN.

Within the hour, flight 175 crashed into the south tower, flight 77 crashed into the Pentagon, and Flight 93 began their revolt against the hijackers, resulting in the plane crashing into a field in Shanksville. By fighting back, the brave passengers aboard Flight 93 may have saved many lives by giving up their own. It has never been confirmed what the intended target of flight 93 was supposed to be, but speculation is either the White House or Capitol.

The Fire

On September 11, 2001 at 8:46am, Flight 11 crashed into the north tower of the World Trade Centre between the 93rd and 99th floor. Flying at 466 miles an hour, the plane severed three gypsum-encased stairwells and dragged combustibles with it. The aircraft ignited the combustibles and fuel, starting a fire. The north tower had only a narrow structural core running through the centre instead of a standard full cage frame. Because of this, the fire compromised the integrity of the internal columns.

People below the 93rd floor were able to attempt to evacuate. Everyone above the 99th floor was essentially trapped. Many went to the roof for an air born rescue; however, the thickness of the smoke and heat of the flames inhibited an air born rescue attempt.

At 8:55am, an announcement sounded in the south tower of the World Trade Centre saying the building has been secured and asking occupants to remain in their offices. At 9:03am, flight 175 crashed at 590 miles an hour into the south tower between floors 77 and 85. All 65 people on board the flight and hundreds within the building died instantly. The fire ignited shortly thereafter and filled stairwells with smoke. Occupants, once again, attempted to escape to the roof for an air rescue that never came. At 9:51, FDNY Battalion Chief Orio Palmer reached the 78th floor of the south tower with Fire Marshal Ronald Bucca. They both reported two pockets of fire and numerous dead bodies. At 9:58am, the south tower collapsed. At this time, FDNY Fire Chief Joseph Pfeifer radioed all firemen to evacuate the north tower. At 10:28am, the north tower collapsed, after burning for 1 hour and 42 minutes.

At 9:37, flight 77 crashed into the Pentagon at 530 miles an hour and started a violent fire. 64 passengers and 125 occupants of the Pentagon were killed on impact. By 10:50am, five stories of the Pentagon collapsed due to the intense heat of the fire. At 1pm, firefighters were still at all locations, attempting to extinguish the fires. The quick response to the attack was coordinated by the National Military Command Centre, but the building needed to be evacuated as it began to fill with smoke. At 5:20pm, 7 World Trade Centre collapsed from fire.

The Aftermath

This tragedy paved the way for new provisions of NFPA codes and standards. The three main items that were affected by 9/11 were communications and interoperability for emergency responders, high-rise building safety, and emergency preparedness.

the NFPA

From the NFPA:

- **Emergency Responder Safety:**

NFPA 1981 Open Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services.
Now required for all SCBA gear to adhere to certifications that provide respiratory protection against chemical, biological, radiological, and nuclear attacks.

NFPA 1851 Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.
Now addresses the cleaning and decontamination of personal protective equipment soiled by such threats.

NFPA 1561, Emergency Services Incident Management System
Provides requirements for using "clear text" terminology during an incident rather than radio codes, with the intent of providing a much clearer picture of what is actually occurring at the scene.

- **High-rise Building Safety:**

In 2004, the High-rise Building Safety Advisory Committee (HRBSAC) was formed to develop proposals for NFPA 1, Fire Code; NFPA 101, Life Safety Code; and NFPA 5000, Building Construction Safety Code.

NFPA's HRBSAC is developing guidelines to develop an Emergency Action Plan for All-hazard emergencies.

Below is a sampling of the timeline of NFPA's code changes as a direct result of 9/11:

2002: Provisions added to NFPA 472, Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, on responding to transportation or other incidents involving radioactive material.

2003: First edition of NFPA 5000, Building Construction and Safety Code, includes hourly fire-resisting ratings used in certain tall buildings. Code also includes performance-based design options, including collapse prevention scenarios.

NFPA 101, Life Safety Code, includes new information on issues to be addressed by an emergency plan.

Standards Council approves NFPA 1026, Incident Management Personnel Professional Qualifications.

2004: The National Commission on Terrorist Attacks upon the United States, known as the 9/11 Commission, recognises NFPA 1600, Disaster/Emergency Management and Business Continuity Programs, as a voluntary "national preparedness standard" in its list of recommendations following 9/11.

2006: NFPA 101 and NFPA 5000 increase the minimum exit stair width from 1120 millimetres to 1420 millimetres when the stair handles a cumulative occupant load of 2,000 or more. Information on stair descent devices for people with mobility impairments, and requirements for tactile exit signs, such as Braille dots and raised letters, are also included in these editions.

First edition of NFPA 730, Guide for Premises Security, addresses reducing security vulnerabilities for buildings and facilities.

First edition of NFPA 731, Installation of Electronic Premises Security Systems, is the security system counterpart to NFPA 72.

2007: Provisions added to NFPA 72, National Fire Alarm and Signalling Code, for fire alarm and mass notification systems that allow mass notification signals to take precedence over fire alarm signals.

2009: NFPA 1, Fire Code, revised to include annex for in-building public safety radio enhancement systems. Requirements added to the code for training building personnel on emergency plan execution, procedures to relocate or evacuate building occupants, a system to account for building occupants following an evacuation, and visual inspection of structural fire resistance-rated assemblies every five years.

NFPA 101 revised to require specific evacuation procedures appropriate to the building, occupancy, and emergency, as well as appropriateness of elevator use, during an emergency; to require an elevator lobby two-way communication system in new construction for persons with mobility impairment and outlines the installation of exit stair path markings; and to introduce the concept of "situation awareness" to allow fuller consideration of the status of systems, features, and occupant movement during a building emergency.

The Department of Homeland Security's SAFETY Act Office certifies 15 NFPA standards as "approved products for homeland security," among them standards for personal protective equipment, professional qualifications, incident management, and preparedness. The standards carry the SAFETY Act Certified logo.

The Federal Emergency Management Agency's Voluntary Private Sector Preparedness Accreditation and Certification Program designates NFPA 1600 as a standard to evaluate preparedness plans for business.

2010: NFPA 72 revised to address in-building and wide area mass notification systems; two-way radio communications enhancement systems; and requirements for the inspection, testing, and maintenance of mass notification systems and radio communications enhancement systems.

2012: Performance requirements for the use of elevators for occupant evacuation and fire service access in buildings are incorporated into NFPA 101 and NFPA 5000.

Requirement added to NFPA 1 for fire department evaluation of in-building radio communication capabilities.

While the 9/11 terrorist attacks were an immense tragedy that impacted all American citizens, they were a learning experience. The citizens, who lost their lives that day, did not die in vain. Because of their sacrifice, we have now made provisions to mitigate future events. IFP

This article originally appeared in the third quarter 2013 edition of F E Moran's online newsletter *The Fire Watch*.

For further information, go to www.fireproind.com

Would You Live in a Timber High-Rise?

Thomas Graham/Arup

Andrew Lawrence

Arup

I don't know about you, but I would be perfectly happy to live in a 20-storey timber building. Wood is sustainable, strong, attractive, and can be surprisingly resistant to fire.

With urbanisation driving cities to build densely and sustainably, I think using wood in tall buildings is an appealing option. For one thing, it is the only completely renewable building material. Second, wood has almost zero embodied energy because it is grown with solar power.

It is also a cellular material like bone, so it is strong and light. Relatively easy to work with, wood lends itself to high quality prefabrication techniques. It is light to transport to site, reducing transport costs and carbon emissions. And it is light to lift into place, reducing the size of cranes required and making the process safer.

What about the fire risk? The massive timber construction necessary for taller buildings does not burn readily, even without protection. Just like a log on a fire, a large timber beam may char on the surface but will still retain its integrity for hours. Compare that with how a steel beam would behave in a fire. Without lots of protection, it would quickly sag and lose its stiffness.

Unfortunately, building codes around the world often dictate that the structure of a building should be non-combustible. This completely precludes timber. There are other codes that require the timber to be protected by plasterboard. I believe that is too simplistic.

Unfortunately, building codes around the world often dictate that the structure of a building should be non-combustible. This completely precludes timber. There are other codes that require the timber to be protected by plasterboard. I believe that is too simplistic. What really matters is that people can escape safely, that the firefighters are not put at risk and that the fire does not spread to other buildings.

We need to address this issue if we are to create successful wooden buildings. This means we need to start assessing wooden buildings in a proper "fire engineering" way, exactly as we do for steel buildings. In other words we need to look at how the overall building behaves rather than just looking at the charring of individual wooden elements. The nine-storey wooden Stadthaus development in London, designed by Waugh Thistleton Architects and completed in 2009, was a great achievement, but it is a tragedy that the wood is completely hidden behind protective plasterboard. I want to engineer safe buildings and also still see the beauty of the wood.

Stadthaus, and the slightly taller Forté tower in Melbourne, Australia – the tallest timber apartment building in the world – were firsts. So it was right that they should adopt relatively simple structural solutions with regular timber walls. But if we really want to develop sustainable buildings that are going to last, then I feel they need columns rather than solid structural walls. This would enable them to adapt in the future to suit changing needs and to be used for open-plan offices.

It is clear that wood has potential for use in tall buildings. Technically, I think we could build 40 stories in wood if we wanted to. But we also have a duty to come up with economic solutions, and I think that is where using wood in combination with other materials is an intelligent option. For one thing, there are not enough trees for us to build everything out of 100 percent wood. And anyway, wood, steel and concrete all have particular advantages that we should be looking to exploit. All I am arguing is that we should be starting to look at wood as a standard option alongside steel and concrete to see if it is right for a particular building.

On taller buildings I expect we will start to see wood used in conjunction with other materials. For example, we could see timber columns and floors with a concrete core to provide lateral stability. By making the most of the advantages of wood in combination with other materials, we can create buildings in which anyone would be pleased to live. IFP

This article originally appeared on the Arup Thoughts website, which can be found at www.thoughts.arup.com

Andrew Lawrence is a structural engineer specialising in wooden and historic structures at Arup

For further information, go to www.arup.com

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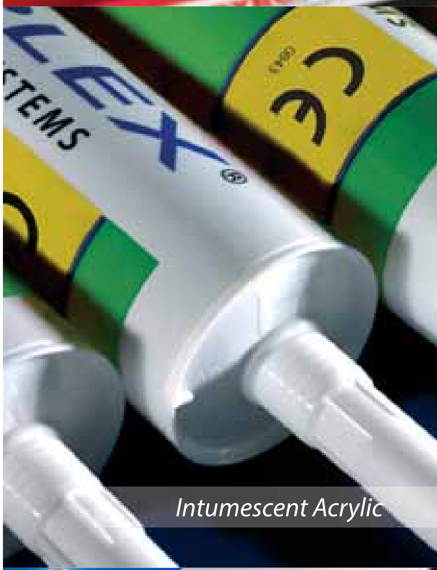

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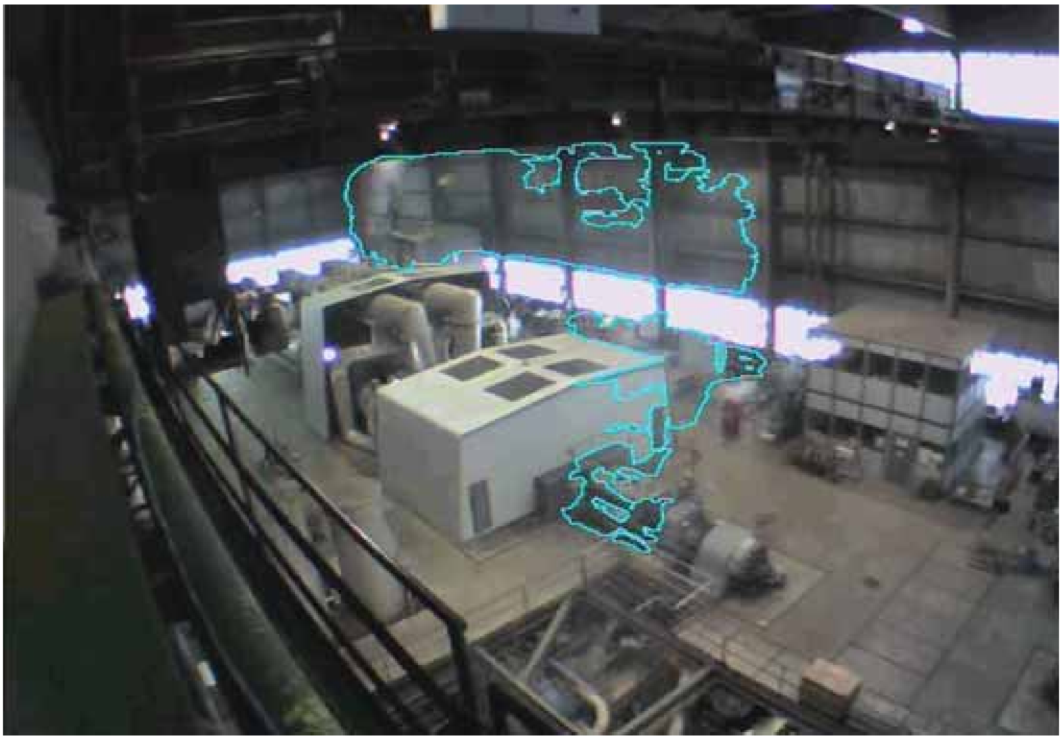
Understanding Vid



Mac Mottley

Fike Video Image Detection

Over the past decade, video image smoke and flame detection has made significant progress in the fire protection field. Video Image Detection (VID) is today widely used for flame and smoke detection in a number of industrial and commercial applications.

Video Image Detection is being used for its inherent advantages over what have typically been the standard available fire protection options. These include:

- **Sprinklers.** Sprinklers are typically mandated by code and are triggered based on high temperature. They are designed to save the building shell and prevent conflagration but, in most cases will not protect the contents of a building or provide final extinguishment.
- **Linear Heat Detectors.** Linear heat can be used as a pre-action for sprinklers and detection for industrial equipment and conveyors but are, again, activated by high temperature and will not detect fires at the early stage.
- **Beam Detectors.** Beam detectors are placed at ceiling level and can cause nuisance alarms based on blockage or misalignment. High ceilings can mean smoke stratification and diffusion issues.
- **Spot Detectors.** Spot detectors are usually either photo-electric or ionization and are placed at the ceiling level, which delays detection of smoke.
- **Aspirated Smoke Detection.** Aspirated smoke detection (where smoke is drawn through a series of tubes back to a central detector) is normally faster than spot and beam detectors but still can have issues with smoke stratification and diffusion as well as smoke transport time and installation costs.

Video image detection is used primarily in large volume facilities with high value assets based on its three primary benefits: early detection, situational awareness, and system flexibility. In fact, FM Global, a leading worldwide industrial insurance company that specialises in loss prevention services primarily to large corporations, publishes a Loss Prevention Data Sheet for Automatic Fire Detection (5-48) that states in paragraph 2.2.1.11: Use video-imaging fire detection systems for the following commercial and industrial applications: outdoor, open areas such as oil rigs, oil fields, mining operations, and forest products, and indoor locations such as industrial plants, boiler or other large vessel protection, turbines, and some clean/chemical rooms.

Early Detection

Video image fire detection provides earlier detection because it processes video images from a camera using software-based analytics that can determine flame or smoke patterns. It basically "sees" fire at a distance and recognises that anomaly to be a fire event similar to a human's eye/brain combination.

Other detection technologies have to wait until some element of the fire (heat or smoke) reaches the detector. It is similar to a human's other senses, like your hands sensing the heat of a warm campfire, or smelling the smoke of burning toast. In both cases you need to be close to the fire event to

eo Fire Detection

detect it, whereas you can see a fire from much greater distance, so providing earlier warning. But just like a human, the camera needs to be able to see the fire, so care must be taken to position cameras so the field of view of the target detection area is not blocked (potentially using multiple camera locations) and also that the area is lit.

Cameras can detect smoke in very low light but there needs to be some minimal level, typically provided by some type of low power lighting like LEDs. Some manufacturers even use Infrared illumination that may be able to detect smoke in a dark area. Flame obviously produces its own light, but some fuels like hydrogen and some alcohols burn so clear almost to appear invisible to the camera and may not be detected.

Situational Awareness

Using network video cameras as detectors provides instant situational awareness and security to personal. Video also reduces delays associated with verifying the presence of a fire before calling the fire department while also helping to immediately recognise a nuisance or false alarm.

Because the technology is deployed over a network the video can be accessed offsite, for example at a corporate headquarters. There are also email packages available that can notify a person anytime an alarm is generated, with a corresponding snapshot of the event, so you can maintain situational awareness through a smartphone. These video systems also continuously record video that expedites the reconstruction and cause and origin of the fire while deterring theft and arson, one of the leading causes of damaging fires. It is also increasingly significant to provide actionable intelligence to those in command during an emergency. Video image detection, along with floor plans, can provide fire department personal with the fire location and smoke conditions inside the facility.

Flexibility

Some VID systems have multiple, functionally discreet algorithms that detect flame, smoke, reflected fire light and/or motion. Each of these algorithms can be enabled or disabled throughout the entire field of view or just in zones based on the hazard and environment. For example, an outside process area may be monitored with the flame detection algorithm enabled throughout the entire field of view, with one flame-blocking zone over the relief flare and others over potential areas of reflected radiant energy while other detection algorithms are disabled.

An additional feature for zones is scheduling. Zones can be set to turn off and on at different times of the day or days of the week, thereby allowing high smoke or flame detection sensitivity and motion detection at night-time or hours of low manning. Some facilities use the motion detection algorithm to monitor entry into normally unoccupied spaces for safety and security. Another scenario is the use of the VID cameras in an engine room or indoor process area with all algorithms of flame detection, motion detection, smoke detection and reflected fire light on, with a

smoke blocking zone in an area of the field of view where steam may be present.

The smoke blocking zone can be set on a schedule for a plant running weekdays to be "on", blocking an area of steam during the daytime and "off" at night-time when steam is not present. Approved flexibility of VID detectors can allow their use in large areas as smoke detectors, replacing up to 20 spot type smoke detectors. VID smoke detection algorithms are commonly approved to detect a four-minute (calibrated smoke generator) at 30 metres based on a 90-degree field of view. This equates to a coverage area of 725 square metres and, since VID detectors are allowed a performance based design, one can extrapolate to 46 metres and increase the coverage to 1551 square metres. This detection can be supplemented with the other algorithms as needed as all are available in the camera software.

These benefits of video image detection have led to growth in protecting facilities in the following markets:

- Oil and Gas Facilities.
- Power Plants (coal and nuclear).
- Manufacturing facilities.
- Warehouses.
- Hangars.
- Cultural Properties.

Embedded Analytics vs. Server Based

Typical video image detections systems installed in line with NFPA and other fire codes are self-contained detectors with embedded analytics capable of viewing and processing the image for flame and smoke. These types of cameras, like the SigniFire IP camera, can be listed to UL 268B (video smoke detection) and FM 3260 (radiant energy flame detection). These devices are powered in line with NFPA code and attached to a fire alarm control panel.

However a large portion of the target facilities do not require detection by code and rely on sprinkler activation for protection. The fires can be rather large and damage can be extensive even when a sprinkler system functions properly. For this reason it is advantageous to provide additional detection and early warning in these areas. Installing a code-compliant system can be a time

consuming and expensive endeavour due to the fact that the system needs to be designed, installed and approved in line with the code.

With the introduction of an Open Network Video Interface Forum (ONVIF) many IP cameras now provide a standard communication interface. This open standard allows video management systems to accept and process a large number of camera makes and models. Manufacturers like Fike VID have used this opportunity to create video image detection servers. The server uses the same algorithms embedded on the UL and FM approved camera to process the incoming ONVIF video feeds for flame and smoke. This allows the end user to easily and cost effectively add flame and smoke protection to third-party cameras protecting areas not otherwise covered with early fire detection.

A VID server can be a rack mount computer running a Windows 7 operating system. The server is preconfigured at the factory based on licenses purchased to process 4, 8, 12 or 16 channels. Additional licenses can be purchased in the field to upgrade systems. Once physically installed, the manufacturer's standard user interface software can be used to configure the system.

The user interface will search for ONVIF capable cameras and once the appropriate password is provided the desired camera can be selected and added to the queue for processing. It is important to make sure that cameras have the latest ONVIF firmware from the manufacturer. For optimum detection, cameras should be appropriately focused, and not all camera views will be acceptable. It is best if the camera looks out into the hazard area covering the floor and ceiling where flame and smoke will exist respectively. Cameras looking outdoors, down at an angle, or covering a small area such as a cash register would not be ideal conditions.

Once the cameras are added to the VID server, the system is typically left for a two-week commissioning or calibration period. During this period events are stored so that sensitivity changes can be made limiting the false alarms. The detection algorithms can have various sensitivity levels (low, medium, high for example) as well as algorithm persistence delays, and the ability to mask or zone out portions of the image.

After commissioning, the system can be placed on line. Any number of computers can be loaded with the remote monitoring software that communicates with the VID server over a network allowing multiple users to view the cameras and incoming alarms. In addition, an intelligent I/O dry contact interface module can be set up to close on specified events, although this system cannot be attached to the fire alarm control panel by code, the contacts can initiate a warning signal or be incorporated into a SCADA system.

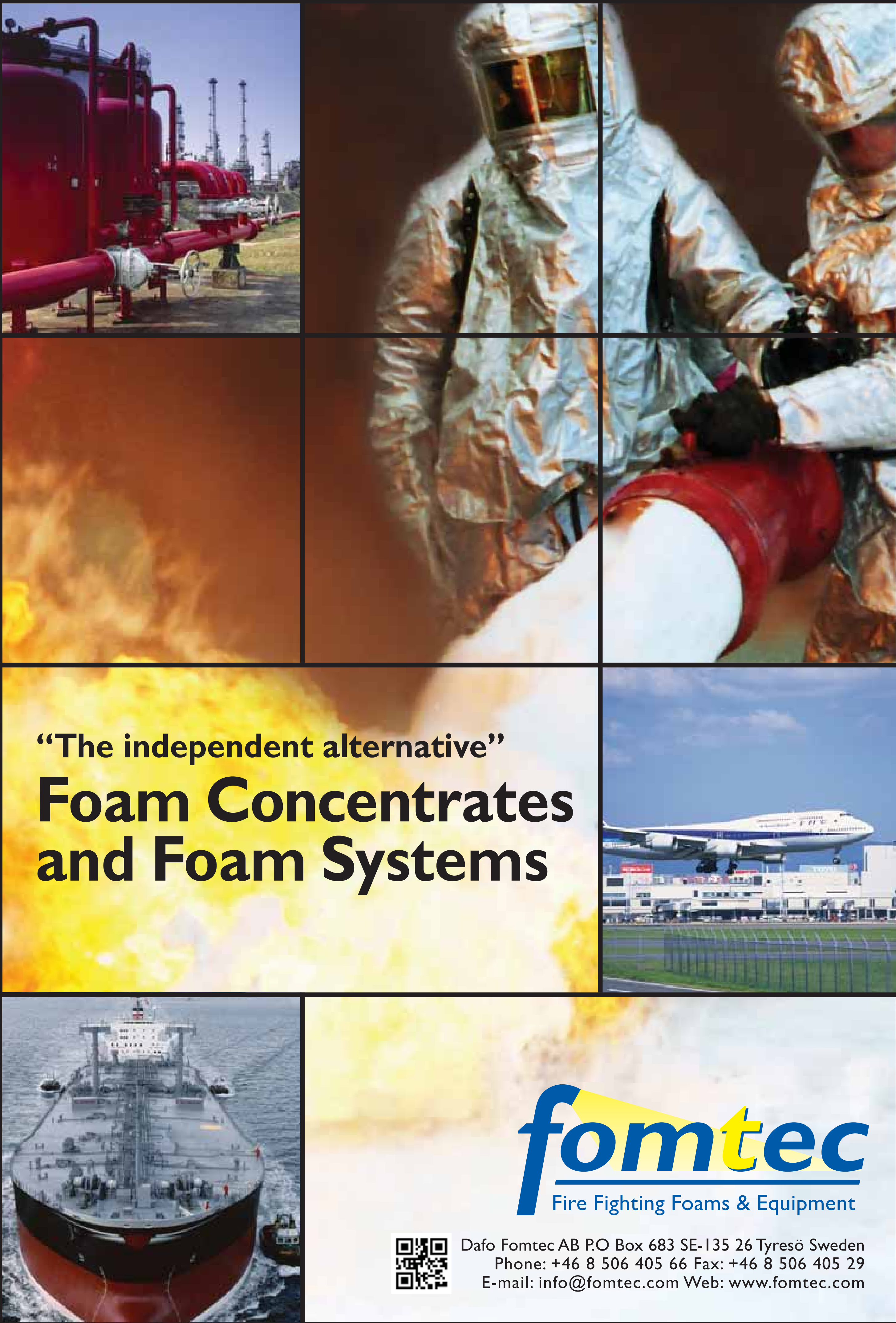
The VID Server can also be incorporated into third-party ONVIF compliant video management systems (VMS) as well. Each camera stream being processed by the VID server can then be accessed by the VMS as an ONVIF channel allowing seamless integration into an existing security system. VID alarms will be acknowledged as an event on the VMS system and handled as any other incoming alarm.

VID servers have been successfully deployed in power generation, industrial manufacturing plants, and facility utility areas (generator/engine /boiler/compressor) rooms. They now allow existing camera networks to serve a dual role as advanced flame and smoke detectors. The systems are easily installed and provide a relatively low cost investment to protect a facility from a catastrophic fire event using existing infrastructure.

In summary, VID flame and smoke detection provides advantages over other types of fire protection in large volume or outdoor facilities protecting high value assets or ensuring business continuity. The inherent advantages of early detection, situational awareness, and flexibility make VID flame and smoke detection an ideal choice for industrial and warehousing type environments. Today VID manufacturers offer code compliant, listed, self-contained detectors as well as server-based analytics capable of processing third-party camera networks. Applying VID flame and smoke detection to protect a facility can be a very effective risk management strategy to enhance a company's safety and security profile. IFP

Mac Mottley is General Manager of Fike Video Image Detection

For further information, go to www.SigniFire.com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Keith Klassen

Waterous

Foam Hardware

– Understanding the Options

Foam is a highly effective tool to include in a fire protection arsenal. It has many applications from fire extinguishment to exposure protection to hazardous material response. In order to make foam effective it is important to both understand how foam systems work and select the correct hardware.

Fire safety professionals are familiar with the fire tetrahedron, which graphically demonstrates the elements needed to create a fire. There is also a foam tetrahedron, which describes the components need to create foam. In order to make foam we need water, foam concentrate, air, and agitation. Water and foam concentrate are first combined in the exact percentages required to create foam solution. Foam solution and air are then agitated together to create finished foam bubbles.

Adding foam concentrate to the water is done by a foam proportioner. Adding air and creating agitation can be done by use of an aspirating nozzle. This is called a naturally aspirating foam system (NAFS). It can also be done by use of an air compressor that is used to inject air into the foam solution under pressure. The agitation then takes place in the hose or in a mixing chamber. This is called a compressed air foam system (CAFS).

In this article we will examine each of the foam hardware components, proportioner, nozzles, and compressed air foam systems individually.

Foam Proportioners

There are many foam proportioners on the market today. They range from inline eductors to direct injection systems. Proportioners can be broken into the two broad categories of manual and automatic. Manual proportioners are systems that require user adjustment and/or specific operating parameters in order to function accurately. The most common manual proportioner is the inline eductor. It requires a typical inlet pressure of 14 bar and a specific flow rate, for example 430 litres-a-minute. When operating in these parameters it provides an accurate foam solution percentage. Variations outside these parameters will cause inaccuracy or no foam. These units work well for tactical operations where a specific constant flow is required. An example would be a large Class B incident.

The typical fire attack in either the wildland or structural arenas requires a constantly varying fire flow as nozzles are opened and closed and lines are added or deleted. Because of this varying flow an automatic foam proportioner is required. Automatic proportioners will allow for changes in both pressure and flow while automatically adjusting and maintaining an accurate foam solution percentage. There are several categories of automatic proportioners on the market today. They include balanced pressure bladder, balanced pressure pump, and direct injection systems. Balanced

pressure bladder and pump systems both use some method of balancing the foam concentrate and water pressure. The foam concentrate then enters the water stream through a pressure differential valve. As the volume of water flowing through the differential valve increases the pressure differential within the valve increases. This increased pressure differential allows more concentrate to enter the stream and treat the larger volume of water maintaining an accurate percentage.

Direct injection proportioners use a high pressure pump, up to around 28 bar that injects the concentrate into the foam manifold water stream. Parameters such as water flow are monitored and the information is feed to a computer. The computer then calculates the amount of concentrate needed and commands the foam injection pump to add the proper amount of foam concentrate maintaining the correct percentage of foam solution.

CAFS systems will always use automatic type proportioners and they will typically be the direct injection type. They are sized from approximately 7 litres-a-minute to 55 litres-a-minute of concentrate pumping capacity. Direct injection systems are powered one of two ways; by electric motor or hydraulic motor depending on the size of the system.

Small direct injection systems usually have minimal controls and provide little information to the operator. Controls consist of an on/off switch and a dial to set the percentage. These systems are usually designed only for Class A foam and will proportion between 0.1 percent and 1.0 percent. These systems are also the least expensive. Larger systems will have a digital display on the control unit to provide information to the operator. This information includes current water flow, foam percentage, and volume of water and foam concentrate used. Controls include an on/off switch, a select switch to change the display, and arrow buttons to make adjustments. Percentage rates of 0.1 percent to as high as 10.0 percent are available with both Class A and Class B capability. The larger these systems are the higher the cost.

Every foam capable apparatus should be equipped with a foam tank fill system. This is a convenience, but more a safety feature as it removes the need to climb on top of the apparatus with buckets to refill the foam tank. This reduces exposure to slip and fall hazards. Some of these systems utilise the proportioner pump as the transfer pump to fill the tank. Others utilise a separate independent pump. These transfer pumps are typically in the 23 litres-a-minute range.

Aspirating Foam Nozzles

A method to add air and agitation to the foam solution and create bubbles is to use and aspirating foam nozzle. Aspirating nozzles are a great foam application tool to keep in the firefighting tool box. Air is drawn into the nozzle through a venturi effect. As the foam solution passes through a restriction in the nozzle a low pressure is created that allows the air to enter the nozzle. This

process consumes energy; the more air that is drawn in the more energy is consumed.

There are a wide variety of aspirating nozzles on the market. Some are fixed tubes with no adjustment. Others are adjustable usually by changing the stream pattern. And finally, each of the nozzle manufacturers make clip-on aspirating nozzles that attach to the bumper of their fog nozzle to be added when needed.

A term commonly used when referring to aspirating nozzles is expansion ratio. Expansion ratio is the ratio between the volume of foam solution pumped into the nozzle and the volume of finished foam bubbles exiting the nozzle. For example if one litre of foam solution enters the nozzle and 50 litres of bubbles exit the nozzle the expansion ratio is 50 to 1. Expansion ratios are broken into three categories. They are low, medium, and high expansion. Low expansion is from 1 to 1 up to 20 to 1. Medium expansion starts at 20 to 1 and goes up to 200 to 1. High expansion begins at 200 to 1 and can go as high as 1000 to 1.

Low expansion nozzles are typically fixed tubes with no adjustment. They produce a wet foam. These nozzles typically operate at 5.5 bar to 7 bar nozzle pressure and a class A foam percentage of 0.5 percent.

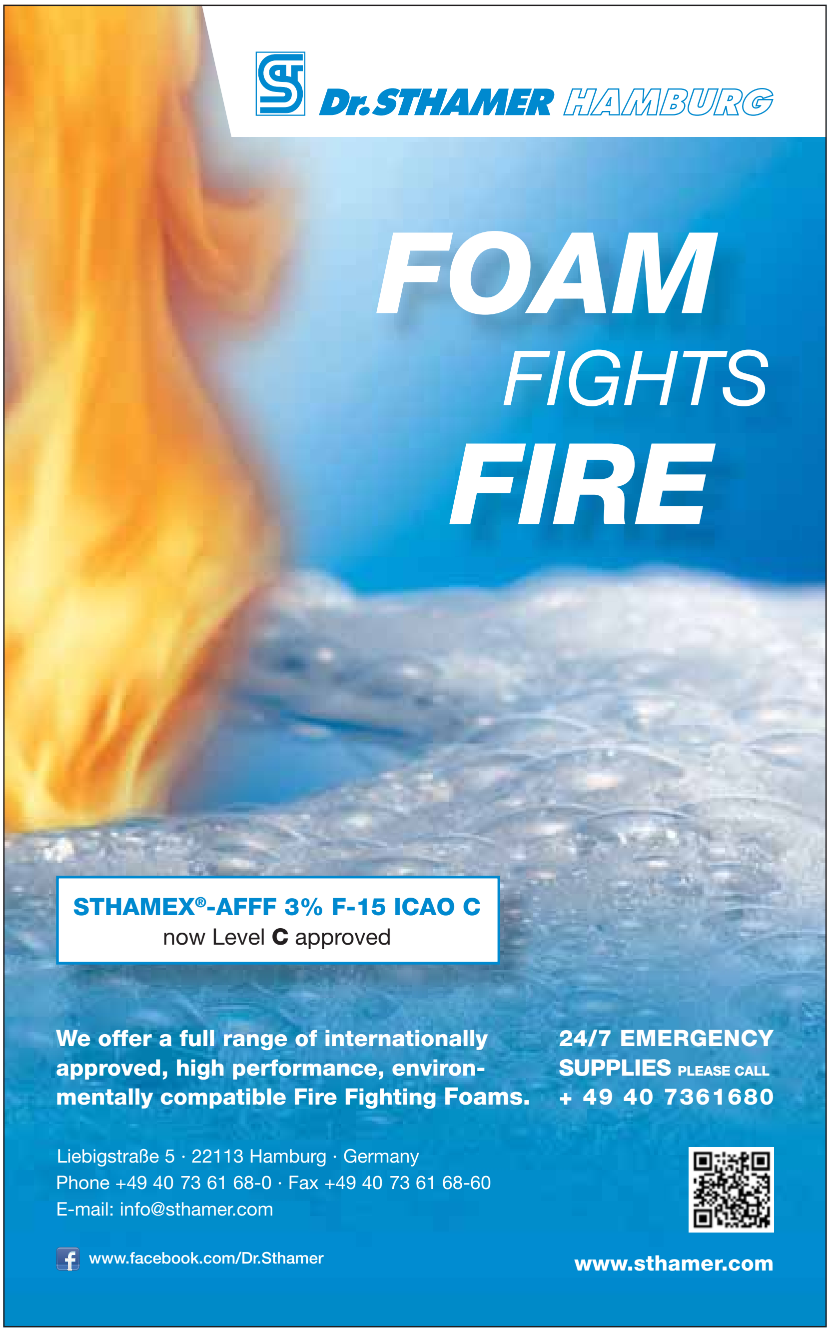
Medium expansion nozzles are typically adjustable allowing variations in the volume of flow and the consistency of the foam. Operating pressure for these nozzles is typically 4 bar. The lower pressure is necessary because as the bubble size increases the bubbles become more fragile. Too high a pressure will simply break them reducing the effective production of the nozzle. Larger bubbles also require more structure which comes from an increase in foam percentage, usually 0.5 percent to 0.7 percent.

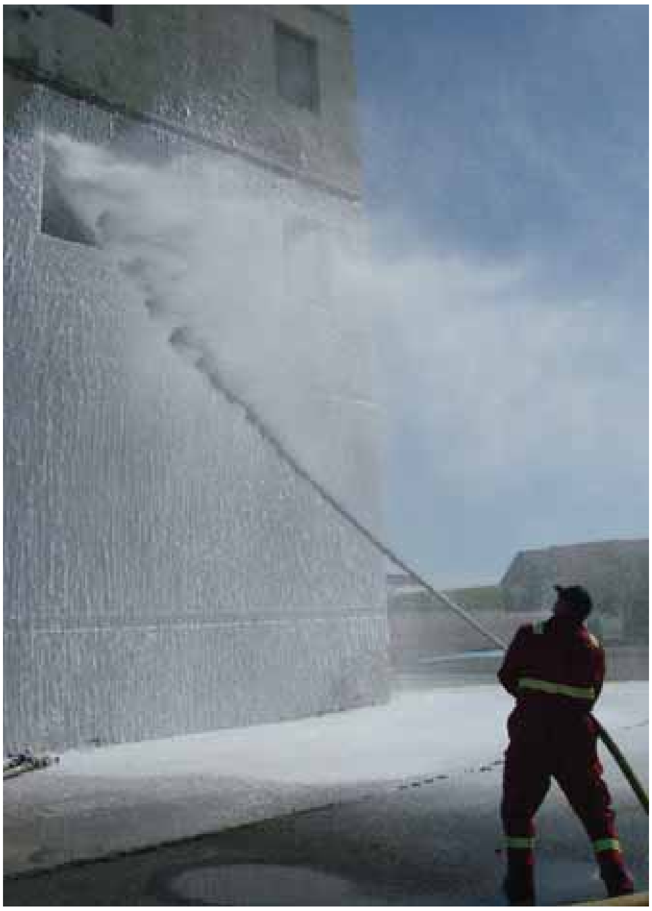
High expansion nozzles produce a large volume of dry foam. The dry consistence is due to the large volume of air and low water content. As the bubbles become even bigger the same principals discussed for medium expansion nozzles apply. Nozzles pressures drop to around 2.7 bar and the foam percentage must be increased to the range of 0.7 percent to 1.0 percent, which is the maximum percentage for class A foams.

Every foam capable apparatus including CAFS equipped rigs should have an adjustable medium expansion nozzle due to its versatility.

Compressed Air Foam Systems

As mentioned earlier, there must be agitation to force the mixing and form the bubbles. The most efficient way to create agitation is a compressed air foam system. In the system, air under pressure is injected into the foam solution as it leaves the discharge of the apparatus. The agitation takes place in a mixing chamber or the fire hose. As the mixture moves through the hose it tumbles and scrubs on the inside liner of the hose creating bubbles. CAFS is capable of producing very fine equally sized bubbles. These bubbles provide the maximum amount of surface area for a given





volume of water and therefore the maximum heat absorbing ability.

The simplest way to think of a compressed air foam system is as three separate pumps tied together. They are a water pump, standard to any pumping fire apparatus; a foam pump or proportioner discussed earlier in the article; and an air pump commonly referred to as the air compressor. In order for these pumps to work properly together there must be check valves to keep the water, concentrate, and air in the proper place. There must also be an auto balance system. Its job is to keep the air and water pressures balanced. This is important as both air and foam solution are being added to the same hose line. If the pressures are not balanced the product with the higher pressure will override and the mixture in the hose will be incorrect. In most systems the air is the last product injected and is added to each individual discharge separately. This is done to provide full control over the foam being produced and to allow individual discharges to operate in different modes at the same time.

Most systems can operate in four modes. They are water only, foam solution, air only, or compressed air foam. Water can be flowed at any time through discharges not connected to the foam manifold or through foam manifold discharges when the foam proportioner is turned off.

Foam solution can be provided for a standard firefighting or an aspirating nozzle through discharges plumbed off the foam manifold by opening the discharge water valve with the proportioner turned on. Air only can be provided. This is done by closing the discharge water valve and opening the air valve. Compressed air foam is made by opening both the water and air discharge valves. The consistency of the foam can be adjusted simply by controlling the amount the water discharge is opened. The farther the valve is opened the more foam solution will enter the line displacing a portion of the air which is also entering the line.

Recent technical developments in compressed air foam systems have concentrated on making the systems more accurate and user friendly. The use of an auto tank fill device manages the water tank level automatically when the apparatus is hooked to a water supply. They make it easier for the operator of the CAFS to maintain consistent operations.

Nozzles for use with CAFS

In a CAFS, when the foam reaches the nozzle the bubbles are formed and ready to fight fire. The most appropriate nozzle is one that has minimal disruption of the bubble structure. Disruption of the bubble structure returns a portion of the finished product back to foam solution decreasing surface area and fire fighting effectiveness.

Smooth bore nozzles allow the bubbles to be discharged with little disruption and are therefore the weapon of choice for compressed air foam. Selection of a smooth bore nozzle typically includes a valve with a large diameter waterway with a tip which is roughly half of the line size. The smaller orifice size will break a portion of the bubbles removing some air and changing the foam consistency. This combination allows the user to change the foam consistence at the end of the line by simply adding or removing the tip.

With the many foam hardware choices on the market today it is easy to obtain a system that will fit the exact needs. To be certain that you are purchasing the correct system for your needs first determine your target hazards and the tactical applications in which you will use foam. Then research the available systems and determine which will best fit your needs. IFP

Today it is easy to obtain a foam hardware system that will fit your exact needs, but first determine your target hazards and the tactical applications in which you will use foam, then research the available systems and determine which will best fit your needs.

Keith Klassen is Instruction Programme Manager at Waterous

For further information, go to www.waterousco.com

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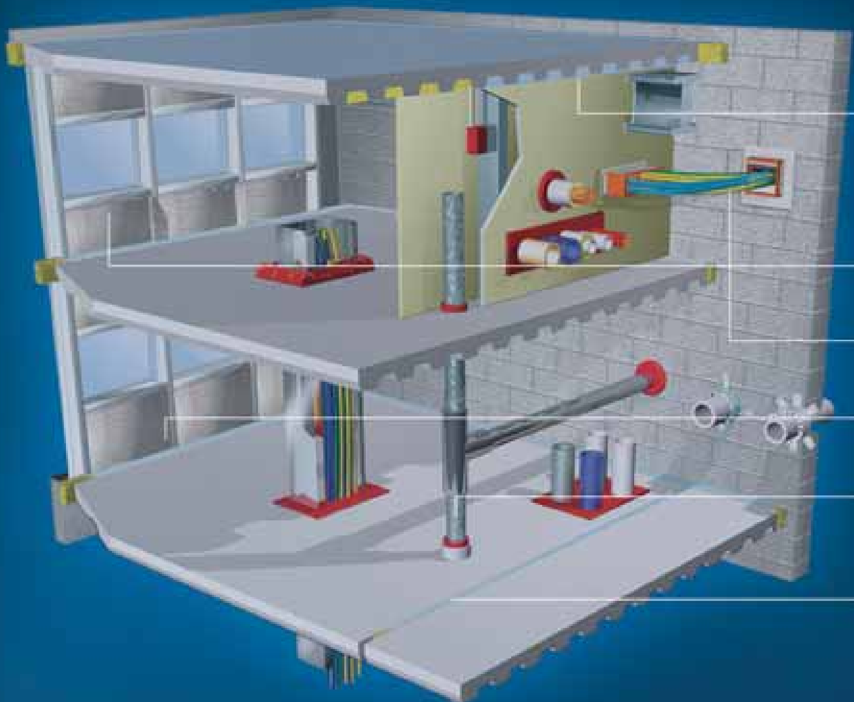

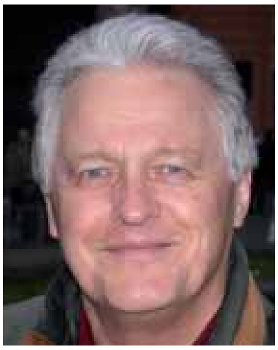

What's New in Alarm & Control Panels?

Graham Collins

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There seems to have been a rush of activity among panel manufacturers since our last round-up in 2012, so here we review the leading manufacturers' latest offerings. First though, Advanced briefly describes EN54 Part 13, which is undoubtedly driving many of the latest developments in the marketplace.

Gold Standard for Fire Systems

ADVANCED contends that every intelligent fire system manufacturer will tell you that its system goes on the wall and works; job done. Except, we all know that job done for fire systems is a continuum from good – large networks that are set up simply and quickly – to bad – stand-alone panel installations that can take hours to set up and sign off.

Add to the mix that the fire system can be: open, multi- or closed-protocol; specified, installed, commissioned and maintained by different organisations; made up of a wide variety of components from different manufacturers, and 'job done' starts to look more complicated. Assuming the installation and commissioning are done and the system is tested and signed off, then all should be good. Well maybe not.

The whole point of a fire system is that, in the event of a fire it does its job. But you cannot test a fire system with an actual fire where environmental conditions affect data transmission and system loads change in ways that no test can simulate. Knowing the system installed will do its job when you really need it to, saving lives and property, can look less certain.

The fire industry has developed a solution that goes some way to resolving this dilemma and it is now mandated in some European countries where a few of the leading manufacturers are investing to support it. The standard in question is EN54 Part 13 (*Compatibility assessment of system components*).

EN54-13 is applicable only to fire detection and alarm systems. It is referenced in installation and performance standards to provide evidence that the complete fire system will function as intended under all expected operating conditions. It is a rigorous standard that specifies a number of system requirements such as: the compatibility and connectability of system components; system design and functional requirements where these could affect compatibility; and integrity requirements when an alarm system is connected to other systems. It also specifies the test and assessment methods that show compliance.

Essentially it specifies that a Part 13 approved system will work independently of component manufacturers and brands at minimum and maximum supply voltages. It is applicable where components are connected via electrical wires and can be used for guidance where components are connected by fibre or radio. In terms of system performance under fire conditions it is the current "gold standard". It is not major component failures that Part 13 aims to combat. In a fire condition the increased current going through the system combined with a high resistance connection, for example an incorrectly tightened screw in a sounder base, is all it could take to stop the system working. Under normal operating conditions it is fault-free but in a fire, the system may fall over.

Advanced's Axis EN system, MxPro 5 panel and ExGo extinguishing control system are all EN54-13 approved and represent a major investment in time and money to achieve this, but one that every manufacturer should make to ensure the delivery of a quality fire system. Manufacturers can also help by designing fault-finding tools into panels that can be used as part of the system installation, for example Advanced's on-board oscilloscope, and by building fault tolerance into networks.

EN54-13 is here in a growing number of influential countries and, while the UK does not mandate it, for customers it is a sign of performance and quality that cannot be ignored.

For more information, go to www.advancedco.com/documents.aspx

Ampac's New & Upgraded LoopSense & FireFinder Panels

According to AMPAC, its LoopSense single or two-loop analogue addressable fire control panel is recognised as one of the most powerful new systems of its type on the market today.

LoopSense control panel

Characterised by easy-to-configure expandability, it fully supports Apollo's open protocol communications and loop devices and uses leading-edge microprocessor-based electronics to provide a flexible control system with high reliability and integrity. The 500mA loop current sets it apart from many of its competitors, allowing more, higher powered devices to be installed on the loops.

Two, up to 17Ah batteries can be fitted as standard in the cabinet, providing more than enough standby capacity for most applications, and up to 30 SmartTerminal repeaters can be connected to a system, saving cabling and costs.

Ampac's new FireFinder Plus panel builds on the reputation of its predecessor, the FireFinder, and offers what the company says is outstanding value and performance for all medium-to-large fire detection installations. It incorporates cause-and-effect programming capabilities, an extensive range of hardware options, supports Apollo's loop devices with 500mA loop current capacity and has space for two 26Ah batteries in the cabinet.

FireFinder Plus is currently available as a one-to-four-loop variant and these can be networked together (up to 100 panels/nodes in a system – up to 100 loops). Up to 30 SmartTerminal LCD repeaters can be connected to a system. Both LoopSense and FireFinder Plus are fully approved to the latest editions of EN54 Parts 2 and 4 by BRE/LPCB and are CPR compliant. They come with a three- year warranty.

For more information, go to www.ampac.net

FireFinder Plus panel

Kentec's Latest Offerings

KENTEC's AlarmSense compatible two, four and eight-zone fire alarm control and indicating panels are now approved and certified to EN54 parts 2 and 4.

AlarmSense

Developed to make the design and installation of a fire detection and alarm system easier and more economic for small-to-medium sized buildings, an AlarmSense installation can, according to Kentec, result in a 20 percent to 25 percent reduction in set-up time compared with a standard four-wire conventional system, because all devices in a given zone can be wired to the same pair of cables.

The AlarmSense range allows Apollo AlarmSense devices to be wired to the same pair of cables, with rapid system configuration for common, zonal or two-stage alarm by simply setting one of the panel's

configuration options. False alarm management is also very efficient, with alarm verification via the general and local alarm facility on AlarmSense sounders and beacons, which is particularly useful in Houses of Multiple Occupation (HMO).

Kentec Syncro AS is a versatile range of open-protocol fire alarm control panels compatible with existing Syncro fire alarm panel technology. Available with one or two detection loops capable of hosting up to 126 devices (Apollo), 240 devices (Argus Vega) or 127 devices (Hochiki). Syncro AS uses microprocessor based electronics to provide a flexible control system with high reliability and integrity. Suitable for all small-to-medium sized fire detection systems, Syncro AS control panels can be expanded and networked to become part of much larger systems if the need arises, therefore providing a future proof solution for any installation.

Syncro AS

The company's Sigma CP range consists of a series of conventional fire alarm control panels designed in accordance with European standards BS EN54-2 and BS EN54-4 *Fire Detection and Fire Alarm systems – Control and Indicating Equipment*. The range comprises two, four and eight-zone control panels, all of which are available in two versions: Sigma K11 range in which detectors and call points are wired on separate circuits to sounders (two sounder circuits are provided), and Sigma T11 range in which detectors, call points and sounders are wired to the same pair of cables. All control panels have an integral, mains powered battery charger and power supply designed in accordance with the requirements of BS EN54-4.

For more information, go to www.kentec.co.uk

Fike Unveils Repeater Panel as part of its Twinflexpro system

FIKE SAFETY TECHNOLOGY has launched a repeater panel as part of its Twinflexpro smart two-wire fire detection system.

The repeater panel is a small remote display unit that can be connected to a Twinflexpro four or eight- zone panel via an RS485 data link, with a maximum of eight repeater panels connected to a single control panel. The unit does not itself connect to or control any devices; it simply reports all fire and fault events that occur in the system. It can also perform system actions over the data link that is silence alarms, reset, sound alarms and silence buzzer. The repeater panel is intended to provide display capability at secondary building entrances, nurses' stations and at any location where the panel event information is required to be displayed.

The Twinflexpro system incorporates the Multipoint combined smoke and heat detector with built-in sounder, which allows the whole system to be easily installed using only one pair of wires for each zone. As Multipoint offers seven different modes of detection, the installation is made even simpler since one device suits all applications. Checkpoint alarm confirmation technology is a feature of the system that has seen it installed extensively in applications such as Houses of Multiple Occupancy (HMO). This is a configurable pre-alarm that can be set on detectors in dwelling areas that allows time to investigate the cause of the alarm before building-wide evacuation is initiated. This can significantly reduce the disruption from nuisance alarms.

This system has the ability to differentiate between call point and detector alarms; can accommodate a maximum of 32 devices for each zone; has separate fault monitoring display for each zone; incorporates a man-walk-test facility and zones can be configured without the need to use resistors or capacitors. Fike can also provide a special output unit that can be situated anywhere on the zone circuit and is ideal for connecting to equipment such as plant shutdown controls and door release mechanisms.

For more information, go to www.fikesafetytech.co.uk

Chubb's New Small-to-Medium Applications Panel

New fire technology puts Chubb in control

CHUBB FIRE & SECURITY has launched ControlMaster, an addressable fire panel specifically designed for small-to-medium sized applications. It is claimed to offer easy-to-use configuration options, integrated signalling controls and extended connectivity. In addition, the range's contemporary design allows for rapid installation while ensuring long-term flexibility for the system owner. It comprises one- and two-loop panels, repeaters and a full set of addressable detection and audio visual devices.

The new ControlMaster range is accredited to EN54:2 and EN54:4 standards and is CPD (Construction Products Directive) approved.

For more information, go to www.chubb.co.uk

Notifier's New "Gem" of a Panel

NOTIFIER BY HONEYWELL has introduced its Pearl intelligent addressable fire panel, heralded as being the company's first in a new family of advanced control panels specifically created to be immune from the threat of false alarms.

The new panel is backwards compatible, networkable and available in high-capacity one- or two-loop models, targeted at small-to-medium installations including residential, office spaces and retail warehouses. It is said to be easy to install and maintain, meeting the system owner's need for a long-term solution that can minimise the incidence of false alarms, provide the flexibility to meet the changing needs of the business and offer low total cost of ownership.

In field trials, Pearl's programming capabilities succeeded in eliminating unwanted alarms, even in challenging environments where there was a high likelihood of them occurring. One example was a block of high-rise flats serving a wide range of residents, including the elderly and those with special needs, where the previously high level of unwanted alarms was reduced to zero.

Where a device in an individual location picks up a smoke signal, the software ensures that a general alarm will be activated only if heat or smoke persists for a pre-agreed time period or extends to a second device. If not, the device automatically resets itself, without the need for a facilities manager or warden to do so, so reducing the risk of accidental activation. The panel uses a digital protocol to increase efficiency, reduce power consumption and improve system diagnostics, control and usability.

The two-loop panel can support up to 636 devices – equivalent to most standard four-loop panels. In conjunction with individually isolated Opal devices it provides a highly resilient system capable of pinpointing a loop cable fault while maintaining full system operation. Pearl's networking capability via Notifier's super-fast ID²Net can communicate a fire signal across a network of up to 16 panels and 20,000 devices in less than one second.

For more information, go to www.notifier.com

Advanced's Strategic Solution

ADVANCED's ExGo extinguishant and suppression control system was developed specifically for sensitive and strategic assets such as server rooms, historic and cultural attractions and control rooms.

It is suitable for almost all single-flooding area applications and includes a range of control options and devices. It is approved to EN54 parts 2, 4 and 13 and EN12094-1 and can be integrated into Advanced's MxPro or Axis EN fire systems or any third-party fire alarm system.

ExGo is said to be very simple to install, with a removable chassis and PSU. All programming is carried out at the control panel via a simple, intuitive menu structure and large LCD screen. An Autolearn Actuator Output circuit ensures no direct manual adjustment is required and all of the sensitive circuits can be analysed and configured by the panel menu system. On-board diagnostics can be accessed from the panel menu and all test modes and disablements are easily controlled. The specific nature of any faults is displayed to aid diagnosis. A time-stamped log tracks all activation events and can (along with all panel settings) be downloaded to a PC tool for reference, storage, filtering and printing.

The panel has 3A universal PSU (1A reserved for battery charging) that can be expanded to 5A; it also has an EN54-4 switch mode power supply with battery standby of up to 72 hours. ExGo's PC software is part of Advanced's Dynamix tools package that includes an extraction tool that allows event logs and system configuration to be downloaded, interrogated and exported to Office applications.

ExGo also offers a peripheral eight-way relay output card that provides eight individually programmable, 1 Amp-rated, volt-free, clean contact outputs, offering maximum flexibility where a number of independent outputs are required. An optional switch module provides a simpler way of correctly terminating the switch point circuits. The switches are easy to wire and multiple units can be chained together on an input circuit. Additionally, the zone active end-of-line module provides active end-of-line monitoring for zone circuits fitted with detectors and bases. The module will create a fault condition on the panel if a detector is removed from its base, without affecting the remainder of the zone. Both comply with the requirements of BS7273-1 and recognised installation codes of practice.

For more information, go to www.advancedco.com

C-TEC offers Touchscreen Control

The new ZFP touchscreen-controlled fire alarm panel from C-TEC is being heralded as offering: "Intelligent fire alarm technology at your fingertips."

Designed and built in the UK, C-TEC's ZFP addressable panel is fully compliant with EN54-2/4 and represents a major breakthrough in fire alarm technology with what the company describes as its massive capability and flexible modular design.

Boasting ten different programmable indicator and switch modules, eight different expansion 'A-Bus' PCBs and two state-of-the-art compact mini-repeaters, systems can be easily and quickly 'built-up' to suit any site, no matter how complex. The ZFP can handle anything from small 'one out, all out' systems to large multi-loop networked systems with sophisticated cause and effects. Up to 64 eight-loop panels can be interconnected over the ZFP's high-integrity fault tolerant network. Each panel possesses a 110 millimetre full colour touch-screen to provide constant feedback on all aspects of system activity.

As well as having access to a range of 'standard' off-the-shelf ZFP panels, customers can select a ZFP configuration to exactly suit their requirements for larger, more complex projects. Three master cabinet sizes are available and all come with a control and display module, a two loop main PCB and a 3A or 5A EN54 power supply. Depending on the application and cabinet size selected, additional indicator and switch modules can be added, together with other options such as additional loop drivers, a network card, one or more A-BUS PCBs, flush mounting bezels and more.

For more information, go to www.c-tec.co.uk


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New ISO Standard for Fire Detection and Alarm Systems

Peter Parsons

International Organization for Standardization (ISO)

The first International Standard for the design and installation of fire detection and alarm systems provides a system solution for life safety in and around buildings. This article discusses the requirements of ISO 7240-14 and the benefits its use can bring to fire safety.

At the end of July 2013, the International Organization for Standardization (ISO) published a new Standard for the design and installation of fire detection and alarm systems. To give the Standard its full title, ISO 7240-14:2013, *Design, installation, commissioning and service of fire detection and fire alarm systems in and around buildings,* we see it is more than just a system design and installation Standard. The new Standard references multiple product Standards that have been published by ISO over the past decade, specifying the requirements that will provide a life-safety system for installation in and around buildings.

ISO 7240-14 was developed by a Working Group of technical experts established by ISO committee ISO/TC 21/SC 3, *Fire detection and fire alarm systems*. The committee has participating membership of 31 countries, with an additional 14 countries as observing members. Over the past decade, ISO/TC 21/SC 3 has published 31 Standards and other documents related to fire detection and fire alarm systems (FDAS) for buildings. Twenty two of these Standards are for products, including components such as detectors, audio and visual alarm devices, and control and indicating equipment.

Minimum Requirements

All ISO Standards specify the minimum requirements. For ISO 7240-14, the minimum requirement is life-safety – to provide building occupants with early warning so they can take action (such as evacuation) in the event of a fire. Property protection is a concurrent beneficial outcome of the installation, but property protection is essentially a commercial business risk decision for a building owner, which may be addressed independently of what has been specified in ISO 7240-14.

Not a Tutorial

ISO experts took the decision that ISO 7240-14 should not be a tutorial on how a fire detection and alarm system should work. Other training material, including national codes and standards, already exist that contain large sections of commentary (for example, BS 5839-1) and informative annexes (for example, NFPA 72, AS 1670.1) that provide industry professionals with guidance information on the selection and use of equipment.

ISO 7240-14 requires that industry professionals have the required level of knowledge and experience to undertake the work required by their role. This is specified in the initial sub-clauses of each main clause; that identifies both the responsibilities and the qualifications required for each role.

Structure

ISO 7240-14 is aligned with the way a project will proceed, through the stages of design, installation, commissioning and approval of a fire detection and alarm system. Once the final installation is approved, additional requirements specify how the FDAS should be used in normal operation, and regular service requirements to maintain the reliable operation of the FDAS.

Recognising that special cases will, at times, be encountered in some installations, additional requirements are included to provide FDAS designers with means to satisfy less common situations that may be faced.

Equipment

Key components of the FDAS are required to comply with the equipment Standards specified in other parts of ISO 7240. These include control and indicating equipment, initiating devices (such as detectors and manual call points), interface equipment (such as modules), and alarm equipment to alert building occupants to a fire situation. The suite of ISO equipment Standards currently includes 22 components, which provides FDAS designers with solutions to suite most installations. Further work is progressing on the development of other equipment Standards (such as video

fire detectors), which will further enhance the useability of ISO 7240-14.

Additional equipment can also be included as part of the FDAS (for example, remote terminals or graphic displays) however the minimum function of the FDAS (to detect a fire and alert building occupants) should not be reliant on the use of the additional equipment.

Compatibility

A specific Standard (ISO 7240-13) has been published to allow various equipment to be assessed for compatibility. The compatibility of equipment (for example, detectors that correctly operate in conjunction with specific control and indicating equipment) is a critical requirement to ensure the integrity of the FDAS across the range of environmental conditions and electrical parameters specific to each component. FDAS designers are required to ensure that all required equipment is compatibly, and that compatibility has been independently assessed.

occupied areas, and the use of a sound system for emergency purposes. The sound system is specified in ISO 7240-16, and the design and installation requirements are specified in ISO 7240-19. ISO 7240-19 is a complementary Standard to ISO 7240-14, with both parts having a similar style. For larger buildings where a simple audio/visual alarm signal is not sufficient, ISO 7240-19 provides a complete occupant warning and phased evacuation solution.

FDAS are often connected to other building systems. Requirements for smoke and heat control (such as fire doors), remote monitoring and interfacing to other building systems (such as HVAC and building management systems) are included in Clause 6.

Installation

Installation should be undertaken in accordance with the design. Not only components, but also other installation materials (such as wiring) need to be in accordance with the design.

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System Design

The largest part of ISO 7240-14 relates to the design of the FDAS (contained in Clause 6).

Design is required to be undertaken using a systematic and documented process. All assumptions, reasons for equipment selection and site-specific information (such as building construction, use and egress paths) are considered as part of the design process. A well-documented design is critical to ensure the performance requirements of the FDAS can be achieved and assessed, and assists with installation, commissioning and any modifications that may be made in a future time.

The designer needs also to be aware of the regulatory regime that may exist. National or regional regulations that place other limitations on the design need to be factored into the final configuration of the FDAS. These may include limitations on the number of devices that can be configured within a detection or alarm zone, the use of installation materials (such as fire-rated cabling), and any requirements for the remote monitoring of fire alarm and fault conditions. Where external constraints permit, Clause 6 provides complete requirements on detector selection and location, requirements for manual call points, and requirements for fire alarm devices.

Fire alarm signalling to building occupants is important for the safe egress of people from the building. ISO 7240-14 allows the use of both audio/visual alarm devices installed throughout the

In practical applications, the installation requirements may change (perhaps due to changes in the building plan or a flaw with the design). Where such situations arise, the designer needs to be involved to prepare and document approved changes. Maintaining the quality of the design documentation is important to ensure that commissioning can proceed against the as-installed drawings, and any third-party certification has full information regarding the design and all assumptions and conditions that support the design.

Commissioning

Commissioning of the FDAS needs to be conducted in accordance with a plan that is prepared prior to the commencement of the process. The commission plan should include all equipment and system checks and tests to ensure the FDAS is installed and operating correctly. The design documents form an important input into the planning process.

Though not required by ISO 7240-14, it may be prudent to ensure that the persons undertaking the commissioning process are different to those who prepared the design.

The conclusion of the commissioning process is a report that includes the results of the tests, including compliance with the design requirements, activation of devices, and interfaces to any other systems that may be installed. The report will be provided as part of the certification requirements.

Approvals

ISO 7240-14 requires independent approval of the FDAS. This final approval will consider all the documentation and certifications (such as product certificates) that have been prepared during the design, installation and commissioning phases of the project.

Normal Use

Following commissioning of the FDAS, the building may be occupied and the FDAS will be operating in the quiescent condition. Operating instructions are required to be available to users. During normal use, routine tests should be conducted to test the effectiveness of the emergency management plan. Records are required to be maintained of these tests. The emergency management plan may need to be altered from time-to-time to take into account changes within the building.

and include justifications within the design documents so that stakeholders can understand the reasoning behind the design choices made.

Alterations to Existing Systems

After the FDAS is commissioned, alterations often occur. Given the life of some FDAS can be very long, alterations to existing systems can be problematic. ISO 7240-14 addresses the requirements for alterations and takes a pragmatic approach to the requirements. Apart from modifications to the documentation, the alteration should include the re-calculation of power supply requirements (especially battery load), and equipment compatibility.

Conclusions

ISO 7240-14 provides a complete solution for the design, installation, commissioning and service of new and existing fire detection and alarm systems installed in and around buildings. Referencing the

ISO 7240-14 can be used together with a companion Standard (ISO 7240-19) covering the design and installation of sound systems for emergency purposes, enhancing the functionality available to users. While cognisant of existing regulations and codes that existing in some countries (such as electrical safety codes), ISO 7240-14 is not constrained by any specific regulations, providing a flexible and useable Standard for many countries.

Service

FDASs are typically installed in buildings for many years. Good design and installation will not ensure the FDAS will operate correctly in an emergency without regular maintenance. As part of the design, the designer is required to prepare a service plan of routine inspections, tests and preventive maintenance to continuously preserve the function and performance of the FDAS.

ISO 7240-14 includes a list of both inspection and test items required to be undertaken. The requirements may be varied, and again, the designer will need to document the variations and the supporting reasons.

Records become important in the event that an emergency occurs and any investigation is undertaken. Reports need to be provided to building owners to show that inspections, tests and preventive maintenance has been undertaken in a prescribed and timely manner.

Abnormal Situations

Uninterrupted operation of the FDAS is certainly a goal of building owners, but abnormal situations do occur. When failures of parts of the FDAS happen, or fires and faults occur, the emergency management plan is required to include steps taken.

Special Systems

Not all building types and configurations can be covered by a single Standard. Special situations will exist (such as where the FDAS needs to interface to a building management system). In this circumstance ISO 7240-14 allows the designer to factor into the design the special circumstance,

large suite of already published equipment Standards, ISO 7240-14 provides users with a well-integrated Standard for the early detection of fire and the safe evacuation of building occupants.

ISO 7240-14 can be used together with a companion Standard (ISO 7240-19) covering the design and installation of sound systems for emergency purposes, enhancing the functionality available to users. While cognisant of existing regulations and codes that existing in some countries (such as electrical safety codes), ISO 7240-14 is not constrained by any specific regulations, providing a flexible and useable Standard for many countries. IFP

About ISO

The International Organization for Standardization (ISO) is the world's largest developer of voluntary International Standards. Standards are developed through international consensus. Since its founding in 1947, ISO has published 19, 500 Standards covering almost all aspects of technology and business.

ISO has members from 163 countries and 3 368 technical bodies to take care of standard development.

ISO International Organization for Standardization

Peter Parsons is Chairman of ISO/TC 21/SC 3 Fire Detection and Fire Alarm Systems

For further information, go to www.iso.org

False Sense of Sec

PU foams tested as linear gap seals cannot be used to seal pipe or cable penetrations unless evidenced accordingly

Wilf Butcher

Association for Specialist Fire Protection

Some might argue that the specification and installation of fire protection is not rocket science; but, how can you be sure that such products and systems, once installed, are fit for purpose?

While it is not an unreasonable assumption that installed fire protection will perform as expected in a fire, the reality is that often this is not the case. And in the wrong hands, this false assumption could have very serious, indeed fatal consequences.

Unlike the installation of a boiler system or wiring of a building, where proof of competence is a legal requirement, the installation of many types of fire protection can be undertaken by absolutely anyone. There is no requirement for any form of qualification, training or for that matter even a rudimentary awareness of how smoke and fire might behave in a real fire scenario. So if it says on the tin: "Gives up to four hours fire protection", what is there to question?

Unfortunately a great deal, not least because the responsibility for ensuring that any kind of fire protection product or system is fit for purpose when installed rests not only with the person who installs it, but also with all those in the process chain leading to its installation, providing many opportunities for the systems to be compromised.

The responsibility for ensuring that any kind of fire protection product or system is fit for purpose when installed rests with a variety of people within the supply chain including: the designer, manufacturer, distributor; main contractor; and installer. And, once the work is complete, the building occupier must ensure that the fire protection is appropriately maintained.

So, although appropriately installed fire protection is not rocket science, it should not be taken for granted that the correct product has been installed in the correct manner to address the required need. The fact that it looks correct does not necessarily make it so.

Ensuring Correct Installation

From the perspective of designers, specifiers, main contractors or responsible persons, the best way of ensuring that fire protection is installed properly is to use third-party certificated contractors. They are required to use trained staff whose competence has been evaluated, whose records are subject to audit by the certification body, and whose work is subject to random inspection by qualified inspectors.

In situations where such expertise has not been utilised, or where an on-going fire risk assessment identifies that a particular fire protection measure may not be fit for purpose, it is essential that written evidence is gained from the installer and/or their supplier in order to verify that the product or system is within the scope for its intended use.

Understanding Test Evidence

It is vital to ensure that the test evidence presented is fit for purpose, as more than one form of test report may be presented. The UK Fire Test Study Group, for example, represents all the major fire test laboratories in the UK, and has identified

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three fire test types and has agreed to report the results as follows:

- **Standard Test**
  The results of such a test are the subject of a full report in accordance with the relevant standard. The report will be comprehensive, with full details of the construction of the test specimen and the testing process.
- **Indicative Test**
  Reporting is normally by letter only, which should give the data relevant to the test result but shall not interpret those results against any classification requirements. A statement is included, as follows:
  "This (these) test result(s) relate to an investigation which utilised the test methodology given in (the relevant Standard); the full requirements of the Standard were not, however, complied with. The information is provided for the test sponsor's information only and should not be used to demonstrate performance against the Standard nor compliance with a regulatory requirement. The test was not conducted under the requirements of UKAS accreditation."
- **Ad-hoc Test**
  A test which has been performed to a non-standard procedure, in the absence of a standardised procedure, but which utilises the principles of fire resistance testing given in the relevant test method. The reports of such tests shall bear the following statement: "This report covers a test which was conducted to a procedure which is not the subject of any British or European standard specification, but the test utilised the general principles of fire resistance testing given in [insert relevant test method]. Since fire tests are the subject of a continuing Standardisation process, and because existing standards are the subject of review and possible amendment and new interpretations, it is recommended that the report be referred back to the test laboratory to ensure that the methodology adopted and the results obtained remain valid in the light of the situation prevailing at that time."

Given the above, it is essential to understand that unless the condition on site is equal to or less onerous than the situation to which the ad-hoc test was based, then the test evidence potentially has no validity. Furthermore it is important to recognise that performance results awarded are a function of the system under test and also the substrate to which it is applied, which it surrounds or fits between.

Heat transfer due to penetrating metallic pipes or cables will have a detrimental effect on fire performance and without suitable evidence may prove outside the scope of application

The seal around small plastic pipes must be non-combustible and consequently the use of PU foam is not suitable

Using Products and Systems in the Correct Context

The frequent misuse of "fire rated" polyurethane (PU) foams is one such example of inappropriately specified fire protection.

PU foams are invariably used in linear gap or service penetration applications and must have their fire performance determined by testing to the appropriate national or European fire resistance test standards. In the UK, the appropriate standard is BS 476-20/22; BS EN 1366-4 in the case of linear gaps and BS EN 1366-3 for service penetration seals.

Once tested to the required standard(s), it is important that the scope of application of the test results is assessed by a competent person or organisation in accordance with current industry-agreed guidance. The products must not be used outside of the scope of such guidance.

For example, PU foams tested as linear gap seals cannot be used to seal pipe or cable penetrations unless they have been tested in that end-use application; and since PU foams are combustible they should not be used in the presence of penetrating metallic pipes or cables, for fire-stopping openings for small plastic pipes, or to seal an opening around an intumescent wrap system.

Inappropriately specified and incorrectly installed fire protection can result in little or no tangible benefit to the fire performance of a building and is likely to offer a false sense of security at a cost that cannot be justified. IFP

Wilf Butcher is the Chief Executive Officer of the Association for Specialist Fire Protection

For further information, go to www.asfp.org.uk

Intumescent Coat Chapter and Verse

Srijith Nair

Allan Jowsey

International Paint

Specifying intumescent coatings for structural steelwork can be a complex task because of the fragmented nature of the cellulosic fire protection market, which is governed globally by a number of rules, regulations and standards.

Fire protection is an important life safety issue and warrants careful attention to detail at the planning and design stage of a project. Ensuring that a specification for passive fire protection to structural steel has been written correctly is critical. This article considers key issues to be considered for intumescent coating specifications.

Overview of the Global Intumescent Coating Market

Fire is a life-safety issue. It is high on the agenda of architects and consultants who specify fire protection in the built environment on projects including commercial office buildings, residential apartments, airports and stadia.

Intumescent coatings are a relatively small segment of opportunity when compared with the overall passive fire protection (PFP) opportunity. It is estimated to be around one-fifth of the total PFP market opportunity, but one that is growing at a cumulative average growth rate (CAGR) of four percent to five percent globally and gaining in popularity among customers and specifiers. As a method of providing fire protection, intumescent coatings is only one of the methods in a wide range of choices available to a specifier including boards and cement-based materials. There are numerous global and local manufacturers in the fire protection industry competing with a wide range of products, all of which have their own potential advantages and disadvantages.

To add to the competitive nature of this market by way of numerous players, incorrect specifications often lead to under-estimation of minimum requirements, which can end up compromising the fire protection requirements of the job.

For what is seen as a very important life-safety issue, the marketplace has witnessed a strong drive towards price competitiveness and price cutting among key players leading to a "price-war" scenario. Arguably, this has also led to larger number of acquisitions and mergers within the PFP market due to the rising input costs that go into introducing a "successful" product.

This highlights the very important point of testing facilities and capabilities that a manufacturers should possess or have access to in order to build confidence in introducing new products to the marketplace. Structural fire protection is a market that has relatively high entry barriers when compared with decorative paint. One of the reasons behind this is the fact that there is a certain minimum level of investment that needs to go into product testing facilities, furnaces and certification assessments before a manufacturer can establish a product line.

Types of Intumescent Coatings

Broadly, there are two types of intumescent coatings, namely thin film and thick film intumescents. The thin film types are generally considered for interior conditioned space where the aesthetic

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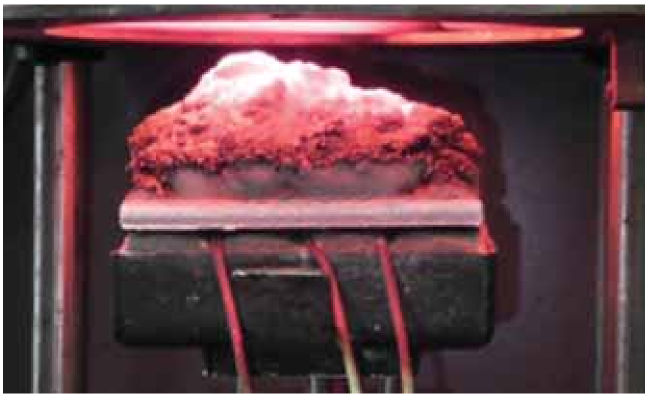
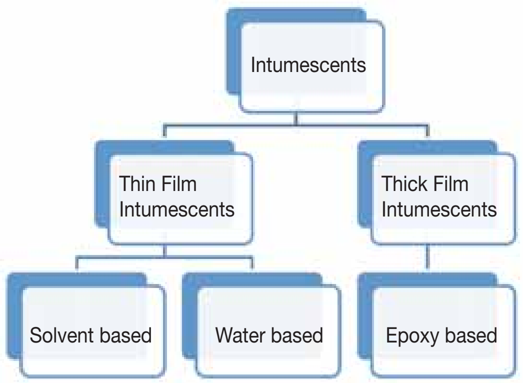
requirements outweigh the environmental durability of the coating system. Typical examples include interior steelwork for airports, tall buildings and commercial office buildings. Thick film intumescent is usually epoxy-based and is used in more aggressive environments including coastal environments and typically where the fire ratings required are higher.

Application methodology can often influence product choice. Epoxy coatings are suitable for off-site application, as they resist mechanical, abrasion and handling damage better than thin film coatings. Solvent-borne coatings can also be applied off-site, whereas water-borne coatings are typically applied on-site. Modular construction in the oil and gas market would therefore consider epoxy over thin film coatings due to the more demanding nature of the environment in which the coating system has to perform.





Sustainability is a key consideration for the construction industry. The appropriate choice of coating is frequently associated with the project-specific required levels of volatile organic compounds (VOCs) and the overall carbon footprint of the building.

Although the carbon impact of the type of fire protection material in use is negligible compared with the embodied carbon of construction materials like concrete, steel, facades, and other types of construction materials, the choice of water-borne thin film intumescents are becoming more popular among architects and consultants.

Selection of Coating System

Selection of the appropriate coating system is critical when specifying intumescent coatings. Each of the components – primer, intumescent and finish (sealer) coats – have specific and important functions to perform.

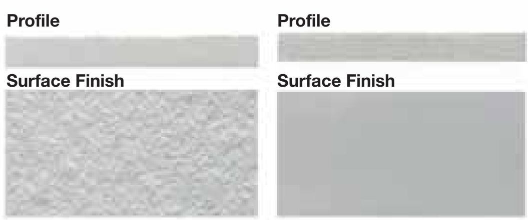
The corrosion protection aspect of the coating system is strongly linked to the choice of the primer. Usually there is a range of primer systems to select from based on manufacturer's guidelines and recommendations. It is important to ascertain that the intumescent coating has no compatibility issues with the selected primer as this could mean additional costs to repair coating failures and/or the intumescent failing to perform as required in the event of a fire.

The topcoats or sealer coats are there to protect or seal off the intumescents from moisture and forms of water exposure. Thin-film intumescents are hygroscopic in nature and they react to water by forming blisters on the surface of the coating. The level of water resistance essentially depends on a number of factors, which also involves some level of trade-off between the fire protection properties of the product versus its water or moisture sensitivity. It therefore becomes important to seal off the coating system as soon as practically possible and as per recommendations of the manufacturer.

Agreeing a Required Level of Finish

The choice of the type of coating system defines the scope of the finish that is possible to achieve.

A standard of finish should be agreed by all concerned parties prior to job start-up and a reference sample produced. The aesthetic finish, as with any application, will depend upon many factors including the skill of the applicator, equipment used, application method, temperature of substrate and location. The size and shape of steel member may also influence the finish that can be obtained as it is more difficult to obtain a good finish on smaller steel members, complex designs and circular sections. It is important to spray-apply material to the best achievable finish before any secondary surface finishing program, for example, rollering and trowelling, is started.



Testing & Certification

Intumescent coatings must undergo a wide range of fitness for purpose testing, which includes fire performance to a stipulated fire curve, environment, durability, and mechanical testing to assess their performance to a wide range of conditions and parameters.

The choice of the appropriate testing, assessment and certification requirement for the product will depend on the region or project location. For example a project in Australia requires testing to AS 1530-4 and assessed to AS 4100, However New Zealand would accept the BS 476-21 standard. Similarly there are different test standards that are required for mainland Europe, North America and Canada, Russia, China and so on to which products needs to be tested and assessed.

The code or standard used to design the fire protection strategy for a building will state that materials used to achieve the required fire resistance must be tested in accordance with a specific fire test standard. Typically, this standard defines the definition and classification of fire-resistant coatings for steel structures including technical requirements, test methods, assessment criteria and specifications relating to packing, marking, labelling, storage, transportation and the product description. The following standards are typically referenced and requested for intumescent coatings:

- BS 476 Parts 20-22 (Historically common due to the influence of British Standards).
- EN 13381-8 (Relatively new standard used across Europe).
- ASTM E-119 / UL 263 / NFPA 251 (North American based tests referenced to due increased use of North American design codes).
- GB 14907 (Chinese fire test standard).
- GOST (Russia and Commonwealth of Independent States (CIS) region).

In the majority of global fire test standards, the size and construction of a fire test specimen would ideally represent the element in its intended position in a building. In such tests, typically a loaded beam is tested horizontally, with protection applied to three sides and with the top flange directly in contact with a floor slab. Columns are tested vertically, with the protection applied to all sides. This leads to the terms "three-sided" and "four-sided" exposure when dealing with fire protection to steelwork. Such fire test standards define a test programme for unloaded sections to explore the relationship between fire resistance, coating film thickness and structural section size. A typical programme may include ten to 40 sections, including short beams, short columns, and tall columns. To address the issue of adhesion to the substrate under deflection (stickability), additional loaded member tests are required to complement the unloaded member tests.

Methods of assessing the performance of fire protection materials have been developed that enable the thickness of protection for a wide range of situations to be predicted, based on a limited number of specimens as defined in a fire test. This approach can then be applied to the test results, which enables predictions of required coating thickness to be made for a range of structural sections.

Leading manufacturers also commit themselves to independent third-party verification and assessment of the test data via various schemes by reputable organisations to give confidence to the customers that the tested material is identical to that supplied for the project.

Application

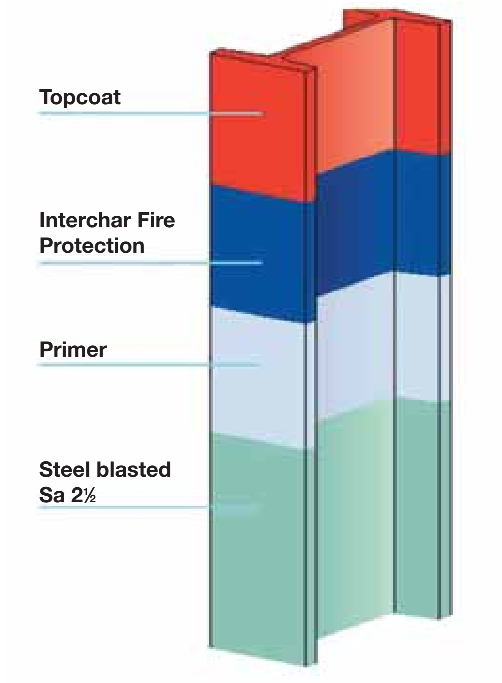
Application of intumescent coatings on structural steel requires a level of specialist knowledge and understanding of the product, therefore choosing the right applicator and the right application methodology also becomes an important consideration. Usually all manufacturers of intumescent coatings provide a comprehensive list of guidance notes and application guidelines that are recommended to be followed while application.

In many situations, fast construction schedules can lead to a limited time for applying fire protection. On-site application is likely to cause disruption due to sequencing and construction schedules and could have a direct implication on cost. Evidence suggests that the most significant cost element in steel framed buildings is not the frame itself but the items built around and attached to it. Consequently any delays to the frame installation will delay the critical path and affect the project completion schedule.

Key Considerations for Specifiers

The specifier should consider the environment in which the intumescent coating system is going to be applied and also the environment it must withstand with respect to the life of the asset in question. Usually the life of the coating system is measured in terms of the years before first major maintenance as described in ISO 12944.

As explained earlier, a range of intumescent coating technologies are available to choose from depending on the environment type and the expected design life of the system. An intumescent coating system has three main components – a primer, a basecoat (intumescent) and a sealer coat. In some cases the sealer coat may not be necessary. The primer assists with the adhesion of the basecoat to the steel, while the sealer protects against degradation of the basecoat. The basecoat is the key component that reacts to and provides protection from fire.



Intumescent basecoats usually consist of the following:

- A catalyst, which decomposes to produce a mineral acid, for example, Ammonium polyphosphates are common catalysts.
- A carbonific, such as pentaerythritol, which combines with the mineral acid to form a carbonaceous char.
- A binder, or resin, simultaneously softens and helps char adhere to steel.
- A spumific agent that decomposes, to liberate large volumes of non-flammable gases such as carbon dioxide, ammonia and water vapour. The gases cause the binder to foam and expand to provide an insulating char many times the original coating thickness.

A typical specification for intumescent coating system will include:

- The steel substrate and its preparation standard e.g. Swedish Standard SA 2.5.
- The primer, its generic type and DFT (dry film thickness).
- The intumescent coat, specified along with the fire resistance rating required.
- The sealer coat, where applicable to include colour and finish.

The fire resistance rating required for the structural steel should be arrived after understanding the requirements prescribed in the building codes and the recommendation from the approving authority. In some instances structural robustness in fire may be assessed by a competent structural fire engineer or specialist consultancy that has in turn justified and advised an alternate fire resistance rating required for all or part of the building in question.

In order to establish the correct intumescent basecoat thicknesses required to meet the specified fire resistance periods, the following information must be made available to a fire protection manufacturer:

- Required Fire Resistance Level (FRL) of the structural members.
- Steelwork drawings to show the elements to be protected.
- Steelwork section sizes and BoQ (Bill of quantity).
- Steelwork exposure, for example three-sided beam or 4-sided column.
- Environment exposure based on ISO 12944 classifications.
- Selection of the preferred application system (on-site or off-site).

The application dry film thickness (DFT) and drying properties of intumescent coatings is a function of time required for application. The DFT is a function of temperature at which steel is assumed to lose its ability to maintain its load-bearing capacity (also known as limiting steel temperature or critical core temperature).

Summary

Fire protection is an important life safety issue and warrants careful attention to detail at the planning and design stage of a project. Intumescent coating technology has evolved over the past decade to provide more efficient, cost effective solutions to customers around the world compared to other forms of passive fire protection. However there are still large knowledge gaps in this area which has a detrimental effect on the industry. This knowledge gap needs to be addressed via sustained, effective and enhanced communication amongst key stakeholders.

Ensuring that a specification for passive fire protection to structural steel has been written correctly is very important. Specifiers are encouraged to open dialogue with intumescent coating manufacturers for advice on how best to select the most appropriate solution for their project. IFP

Srijith Nair is Global Business Development Manager – Fire Protection and Dr. Allan Jowsey is Fire Engineering Manager at International Paint

For further information, go to www.international-pc.com

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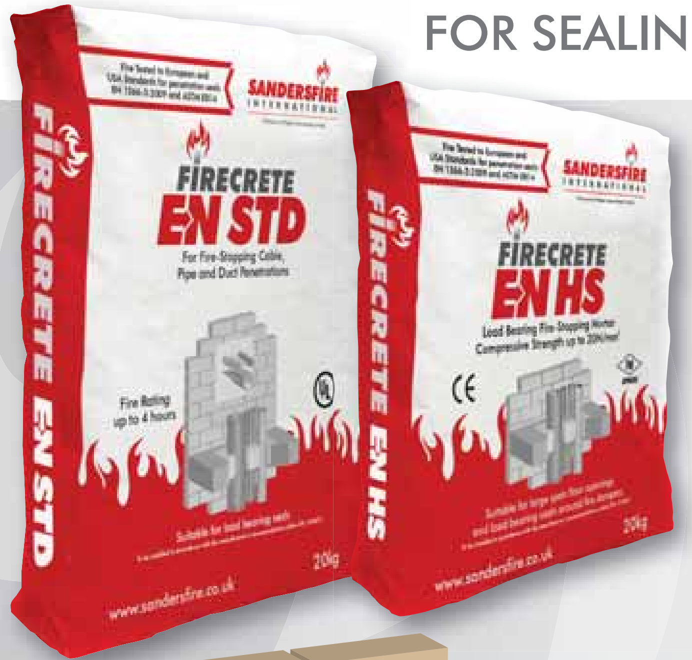
FIRE RATED MORTARS

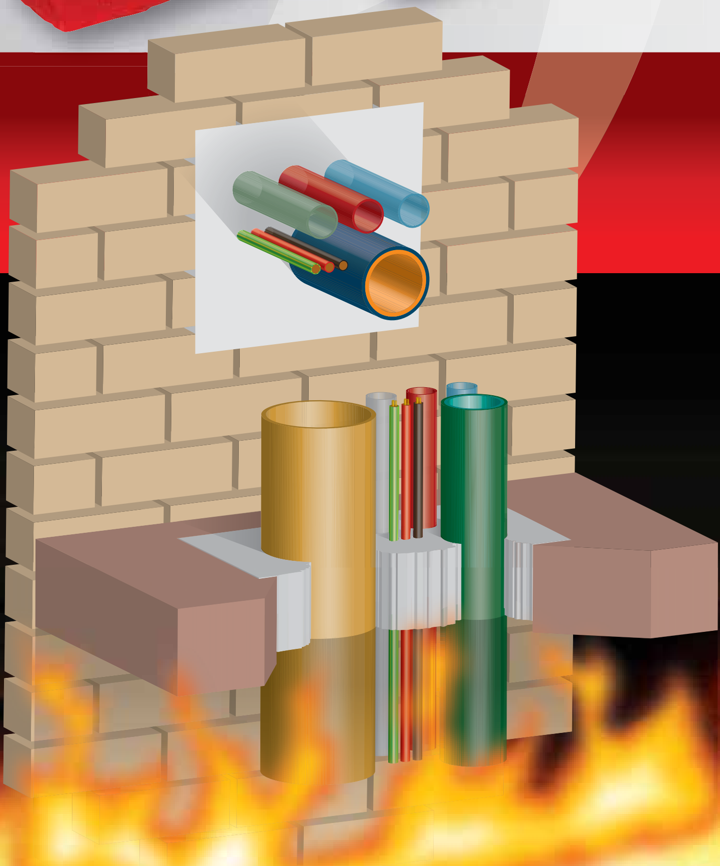
FOR SEALING WALL & FLOOR PENETRATIONS



▶ Non-Shrinking, gas tight seals
Mixed with water, Firecrete is trowelled or poured into wall or floor penetrations around services to stop the passage of flame, smoke and toxic gases

▶ Excellent workability ranging from stiff to pourable consistency
Fully set within 2-3 hours

▶ Load bearing performance in floor seals
High compressive and flexural strength



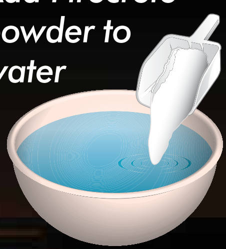
Tested & Approved to...

- EN1366-3 2009
- BS476 p20, 1987
- ASTM E814

CE FM APPROVED UL

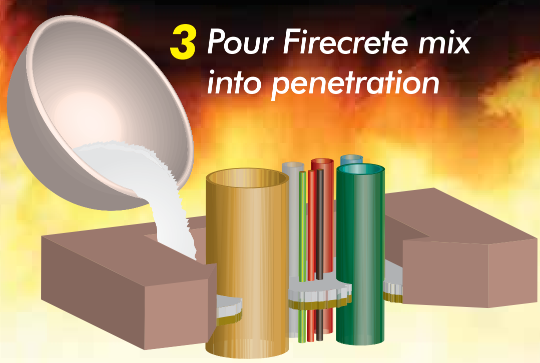
▶ Easy Preparation & Application...

1 Add Firecrete powder to water



2 Mix until smooth

3 Pour Firecrete mix into penetration



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Protecting Cable Trays Against Hydrocarbon Fire

Sean Appleton

3M Oil & Gas

This year marks the 25th anniversary of the Piper Alpha disaster in the North Sea, in which 167 men died. More recently, tragic incidents at oil and gas facilities in the US, Argentina, Venezuela and Japan have served as a timely reminder of the devastating human, financial and ecological impact of a fire. These events highlight the need for fire safety to be given prime consideration.

When a fire occurs at a refinery, offshore facility or petrochemical plant, the electrical systems that serve critical areas such as control rooms, process equipment, ventilation, sprinklers, alarms and other emergency systems must remain operational. In particular, cables that ensure the activation of emergency shut down valves (ESDVs) must be adequately protected in order to isolate the flow of fuel to the fire, preventing further escalation of fire and explosion. The fire protection of electrical raceways or cable trays that act as conduits for cables supporting these process-critical functions is therefore of vital importance to operators.

As well as mitigating against the financial implications that loss of property and disruption to ongoing production brings, a robust, well designed fire protection system can prevent catastrophic loss of life and devastating environmental impact.

A good starting point when considering the specification of such systems is the American Petroleum Industry (API) 2218, *Fireproofing Practices in Petroleum and Petrochemical Processing Plants*, which offers guidance for ". . selecting, applying, and maintaining fire proofing materials that are designed to limit the extent of fire-related property loss in the petroleum and petrochemical industries." According to API 2218, "The principal value of fireproofing is realised during the early stages of a fire when efforts are primarily directed at shutting down units, isolating fuel flow to the fire, actuating fixed suppression equipment, and setting up cooling water streams."

A number of options are available to operators for providing hydrocarbon fire protection to cable trays including calcium silicate boards, intumescent and ablative coatings, ceramic fibre blankets and endothermic mats. Each of these materials has different properties, which operators should evaluate in order to select the most appropriate system for the requirements of their specific application.

Design Considerations

When specifying fire protection systems for for cable tray applications, specifiers should consider a number of criteria, including:

- The proven ability of the system to maintain circuit integrity under fire.
- Ampacity derating.

Case Study – Midwest Refinery

During the late 1990s at an oil refinery in the US Midwest, a pipe containing combustible material burst, resulting in a fire plume 4.5 metres above ground. The fire's intense heat threatened to breech a nearby tank within the refinery that contained hundreds of gallons of hydrofluoric acid.

Immediately recognising the seriousness of the situation, plant employees sought to move the acid to another tank away from the fire. A cable tray containing critical control circuitry required to send diverting signals to valves that had been exposed to the fire. This circuitry needed to stay operational to allow refinery employees to safely transfer the acid. Fortunately 3M E-Mat had been installed to protect the cable tray, helping to reduce the danger to employees and nearby residents.

The emergency electrical circuitry protection enabled refinery personnel to drain the tank in 30 minutes using remote controls. After the tank was drained, the fire continued to burn for over three hours before finally being extinguished. The following day, the contractor that had installed the E-Mat inspected the cable trays and found they had suffered no damage as a result of the fire. Had the tank been ruptured and its contents released into the atmosphere, as well as injuries to refinery workers, potentially hundreds of residents in the surrounding community would have been at risk of harm. After material repairs, the refinery was able to return to its pre-fire operating capacity within four days following the fire.

- System flexibility requirements.
- System weatherability requirements.
- Weight load capacity.
- Total system installation cost.

All fire-resistant systems should be tested in accordance with industry standards in order to ascertain how the system will perform when subjected to a high intensity hydrocarbon fire. API 2218 recommends UL1709 (or functional equivalent) as the primary standard for hydrocarbon fire testing. UL1709 reaches 1100°C within five minutes, and maintains that temperature for the duration of the test.

API 2218 also recommends that critical wiring and control systems be protected for 15 to 30 minutes to UL1709 or equivalent testing if the control wiring is used to activate emergency systems during a fire. A reputable materials supplier will be able supply appropriate documentation to validate such testing.

- **Ampacity Derating.** This refers to the reduction of a cable's ability to conduct electricity and can be tested through the use of IEEE 848 Standard Procedure for the Determination of the Ampacity Derating of Fire-Protected Cables.

  The higher the level of insulation provided to a cable, the less current it can conduct without risk of damage from overheating. Therefore, if a cable is derated by 40 percent it can only be used to conduct 60 percent of its ambient capacity. This can have major implications on design cost, footprint and overall system weight.
- **System Flexibility.** The choice of fire protection system should reflect the existing maintenance regime and possible requirements for future cable alterations. A more fixed system will be difficult to re-enter for inspection and upgrade of cable trays.
- **System Weatherability.** The location and level of exposure of a cable tray can vary greatly as can the weatherability performance of fire proofing materials. Systems exposed to high levels of liquid or vapour may require additional surface protection such as a top coat or surface cladding.

  UL 1709 testing includes a standard set of exposures for weatherability and chemical tolerance as part of its normal testing protocol.
- **Weight Load Capacity.** Weight load capacity of cable trays will have an influence on the weight, and therefore type of fire proofing materials which can be applied.
- **Total System Installation Cost.** Total system installation cost should be evaluated based on the total material costs, labour and installation costs, expected life cycle and the associated maintenance and replacement costs.

  When upgrading existing facilities, disruption to ongoing operations as a result of system installation should also be a key consideration.

Endothermic Technology

Specifiers are increasingly turning to endothermic materials for hydrocarbon protection of cable tray applications due to its flexibility, cost effectiveness and performance properties.

The term "endothermic" describes a reaction in which the material absorbs energy from its surroundings in the form of heat. When exposed to high temperatures, endothermic materials release chemically-bound water to cool the outer surfaces of the material and significantly retard heat transfer. Endothermic material is usually supplied in 'blanket' or 'mat' form providing the flexibility for installers to wrap the material around critical areas of all types including cable trays, conduit, equipment shrouds and other electrical systems.

Unlike traditional hydrocarbon fire protection materials such as lightweight cementitious and intumescent coatings, endothermic materials require minimal preparation to install, with no need to prime or recoat the substrate. In addition, endothermic blankets reduce the possibility of human error in mixing and application, while significantly reducing installation time, wastage and mess. A further benefit of the system's flexibility allows it to be installed easily and maintained with virtually no disruption to surrounding areas. The product is also re-enterable and can be removed and reinstalled for quality inspections or future refits.

Advanced endothermic materials such as 3M Interam Endothermic Mat ('E-Mat') can be used for both internal and external applications and offers excellent performance in many fire scenarios, including large hydrocarbon pool fires in accordance with UL 1709 (ASTM E 1529).

Conclusion

3M E-Mat has been used extensively around the world for over 30 years and is ideal for effective fire safety solutions for both offshore and onshore energy environments. As a major hazards industry, reducing the number of dangerous occurrences and improving safety standards should be key priorities. The continuous development and application of new technologies that can improve safety performance is therefore vital. IFP

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Healthcare Fire Su
Finding the Right

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A major fire in a hospital is truly a nightmare scenario but, with the right suppression in place, it need never happen.

The majority of commercial buildings are occupied by staff that use the premises day-in, day-out. Should a fire break out, all activity can come to an immediate halt, albeit that business may well be disrupted, often at considerable expense. Even where a building is used by large numbers of occasional visitors, such as municipal buildings, convention centres and stadiums, there are normally few physical impediments to hamper an orderly, swift and safe evacuation from the premises.

This is not the case with healthcare facilities, and the designer of the building, the fire engineer, and companies providing fire suppression solutions have to contend with a far more demanding set of circumstances.

Frequently, hospitals comprise not just one, but any number of buildings, sometimes of varying ages, which means inevitably they were built to comply with codes and standards that have been superseded and – invariably – made more demanding. The fire safety task of the particular facility's management may be made more complex, as rooms or even entire buildings, particularly in older hospitals, are frequently subject to a major change of use, and hence a change of fire risk. What was once a ward may become an administrative area, a laboratory or blood bank. Similarly, the installation of a new piece of high-technology diagnostic equipment may have a major bearing on the pattern of use to which a particular area is put, or inhibit a previously designated safe exit route.

These aspects, though posing difficulties, somewhat fade in their significance when the real issues that are particular to fire safety in hospitals and medical centres are considered.

While hospital staff are invariably well trained in fire safety and evacuation procedures and are knowledgeable about assembly points, the same certainly does not apply to the patients. In addition to having no idea of what to do in an emergency, they are at best already anxious and usually in some discomfort; at worst they could be traumatized by an accident or even unconscious following an operation.

Patients in hospital can range from new-born babies to the elderly, who may be severely disabled and possibly senile. Some may be in intensive care, drug dependent, attached to immovable monitoring, breathing or other life-support equipment, or even under the surgeon's knife when a fire breaks out.

ppression – Prescription

Intensive Care

So, when devising fire engineered solutions for hospitals and healthcare buildings, fire engineers understandably take a different approach than the one they would adopt for most other buildings. In the majority of cases, personal safety – as opposed to property protection – depends on the swift, orderly and safe evacuation in the event of an emergency. Not so with hospitals, where the over-riding aim of the installed fire suppression systems is to enable patients and staff to be "defended in place".

Even where the emphasis is placed on achieving horizontal rather than vertical evacuation, mass evacuation is not often a realistic option. It would be too stressful, too dangerous and too time consuming. Inevitably, what architects and fire engineers working on evacuation strategies refer to as the Required Safe Egress Time may be greater than the Available Safe Egress Time. So, fire safety for healthcare buildings must be based on suppressing the fire rather than evacuating the building.

This places much greater reliance on firefighting systems and protocols. In these circumstances, fire detection and alarm, fire suppression, and the passive fire safety aspects of the building must all work together to avoid, where at all possible, the need to evacuate patients. This demands particularly skilfully designed solutions, coupled with the use of the most reliable and quick acting suppression systems.

At the same time, there is a need to protect expensive medical and surgical equipment; to safeguard vital clinical records; and to ensure that the suppression agent does not itself endanger life or cause unnecessary alarm and panic. Finally, there is an imperative need to ensure, once a fire has been put out, that the hospital can return to full working order in the shortest possible time. Added to these constraints is growing awareness of the importance of using sustainable suppression agents that do not adversely impact on the environment.

So, where are the particular fire risks and challenges in hospitals, healthcare centres and medical centres? In addition to protecting the structure of the building itself, these can be broadly summarised as:

- Power generator and power back-up systems for the hospital's essential services.
- Heliport and air ambulance landing decks.
- Data centres and patient record archives.
- High-value diagnostic equipment.
- Kitchens and food preparation areas.

Diagnosis for Safety

There are a number of standards and codes of practice that the architect and fire engineer have to take into account. These include three NFPA [National Fire Protection Association] standards: NFPA 99: 2012 Health Care Facilities Code; NFPA 5000: 2012 Building Construction and Safety Code; and NFPA 101: 2012 Life Safety Code.

NFPA 99 fosters fire safety and fire protection with rules for the safe application of electrical systems, gas and vacuum systems, and environmental systems, along with materials and emergency management practices. The current edition reflects recent developments in medical equipment and processes as well as new methods to mitigate fire, explosion, and electrical hazards. NFPA 5000 keeps pace with the industry's most advanced design and construction rules regarding the protection of occupants and building contents with the latest requirements to minimize danger to life and property. It covers both evacuation equipment and procedures and collapse prevention.

NFPA 101 aims at maximizing occupant protection from the effects of fire and related hazards. It establishes the benchmark for safety in all types of structures and a minimum threshold of safety in both new and existing structures. NFPA 101 also contains a performance-based compliance option, providing more flexible criteria for building rehabilitation to encourage adaptive reuse of buildings without compromising fire safety. It includes specific requirements for sprinklers – including additional sprinkler mandates for all existing high-rise healthcare buildings – alarms, building egress, emergency lighting, smoke barriers, and special hazard protection.

It is also important to take into account the building safety and fire prevention codes and standards developed by The International Code Council [ICC]. These establish minimum safeguards

and are a set of comprehensive, coordinated building safety and fire prevention codes. They have been adopted by 50 states and a number of prominent federal agencies.

The Council's International Fire Code includes regulations governing the safeguarding of life and property from all types of fire and explosions hazards. Topics include general precautions against fire, emergency planning and preparedness, fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, hazardous materials storage and use, and fire safety requirements for new and existing buildings and premises.

Appropriate Treatment

While fatalities due to fire in healthcare premises are thankfully rare, even the smallest fire can result in significant disruption to the well-being of patients and the continued delivery of patient care. So, to provide reliable, swift and effective suppression for such a diversity of challenges calls for the use of a number of suppression technologies.

For example, sprinklers are now so widely accepted as the most appropriate technology for safeguarding healthcare building structures and ensuring service continuity and life safety that it is difficult to overstate their value. This is a view supported by the majority of fire and rescue services. While, traditionally, they have been installed with the primary purpose of property protection, over recent years their contribution to life safety has been increasingly recognized. This can be attributed largely to their excellent record of detection and suppression, as well as their ability to reduce the size of a fire to a greater degree than would otherwise be the case without sprinklers.

Foam-based fire suppression systems are commonly used to safeguard both power generator and power back-up systems and heliport and air ambulance landing decks, although "clean" agents are also used frequently to protect the former. Put briefly, foam is a stable mass of small, air-filled bubbles with a lower density than oil, gasoline, or water, and suppresses a fire by separating the liquid fuel from the oxygen that the fire needs for combustion to take place or continue.

Clean agents are typically the preferred solution for data centres and patient record archives. This ideally comes in the form of an inert or naturally-occurring gas system, or the latest fluid-based systems that, when discharged, instantly transmute into a clear, colourless and odourless gas.

In addition to the undeniable performance of these latest systems, they have impeccable environment credentials, with a negligible impact on the environment, insignificant global warming potential and zero ozone depleting potential. After extinguishing the fire, the suppressant is dispersed through natural ventilation. Significantly, where any interruption to the provision of healthcare service needs to be kept to an absolute minimum, the discharge of these agents does no harm to sensitive electrical equipment and requires no post-discharge clean-up.

However, in some hospital locations, magnetic interference could potentially damage sensitive equipment – such as CAT scan and MRI imaging equipment – or put the equipment's performance in doubt or at risk. In these instances, special purpose-designed portable extinguishers are available that are constructed entirely from non-magnetic materials. They are also safe for inadvertent use on electrical equipment up to 1000v at a distance of three feet.

Hospital kitchens, which can be called upon to provide thousands on meals a day, are a particular hazard that demands the quick detection and suppression of high temperature cooking oil fires that can erupt into flames in an instant. The most effective systems on the market use advanced extinguishing agents that ensure vapour containment and cooling of the cooking appliance, plenum, and ductwork areas to help prevent re-ignition after initial flame knockdown. They provide automatic around-the-clock protection using proven fusible link detection and release system technology.

Lasting Cure

Ensuring the safety of patients and staff is certainly a major challenge and the statistics are staggering. According to figures published by the American Hospital Association, over 35 million people are admitted to hospital in the USA every year; nearly 118 million people are treated in accident and emergency departments; and hospitals employ more than five million people.

So fire safety is a daunting task, but one that is made more achievable if fire suppression is considered at the earliest design stage, and if hospital managements, architects, fire engineers and fire suppression system manufacturers work together with a shared fire safety agenda. Fire safety is also an on-going process that necessitates regular risk assessments to be conducted to ensure that alterations to an existing building structure or a change of use of a particular area have not created a fire risk that lacks the most efficient and reliable suppression protection.

It is really a matter of careful diagnosis of the risk, prescribing the most appropriate solution, and ensuring that the remedy continues to meet the fire challenge. IFP

Innovation of Fire Equipment

Doug Marti

Trelleborg Offshore and Construction

Technological developments have revolutionised deep-water drilling and production in recent years and the need for high performance, robust and dependable solutions has never been greater. This is because in the harsh environments presented by the offshore world, the requirement for equipment to operate safely and effectively while providing peace of mind is paramount.

However, with a significant number of aging platforms and rigs still in use across the globe, can they keep up with the pace? With fire protection a critical part of on-board safety, innovative corrosion-free, rubber-based solutions can be the key to helping bring an aging fleet of platforms back to life, while still creating a safe working environment for all and meeting the necessary industry standards.

Pushing the Limit

The oil and gas industry is renowned for continuously pushing the limits. The exploration of offshore oil and gas has been moving to deep-water fields and demands have grown for wells to be drilled deeper and reach further in order to provide more cost-effective and safe well completions. Added to this challenge is the requirement to extract more oil and gas than ever before, and exploit ever harsher reservoir environments in new locations around the world.

In this difficult economic climate, customers require superior, cost-effective solutions with an increased focus on cost and longer life. There was a time when customers required products that could last 20 years – now it is often up to 40 years.

When it comes to choosing the most suitable material to handle these challenges, rubber-based material is, not surprisingly, becoming a more popular choice within the offshore industry due to its flexibility and durability. Compared with alternative materials, such as steel and fiberglass, rubber has a wide temperature range and exceptionally high pressure resistance. It is a diverse material that can damp, seal and protect, and most of all, it has an extremely long lifetime.

A Question of Safety

With all this in mind, it is no surprise that safety is a key priority for the offshore oil and gas industry, and ensuring safety on-board any production facility is absolutely vital.

Critical to delivering on-board safety is advanced fire protection systems, specifically the fire deluge system which, designed to protect areas where fire is likely to spread rapidly, is now commonplace on offshore facilities. While relatively simple in design and installation, its operation is essential for the safety of on-board personnel,

Protection

asset protection and preventing event escalation. So, in the offshore oil and gas sector where the risk of rapid fire spread is greater than most, fire-stop solutions such as the fire deluge system, need to provide full assurance to the on-board team that they will not fail to deliver on any critical fire water or utility piping installations.

However, traditionally used carbon steel fabricated deluge systems are prone to corrosion when carrying salt-water, which can restrict or even block flow as rust forms, in turn reducing the effectiveness of the system. This has resulted in the industry suffering from costly shutdowns and repairs, and in the worst-case scenario, risk of failure in an emergency.

Next Generation Protection

As such, the industry has seen an increase in corrosion-free fire-stop alternatives that prevent such issues and give peace of mind to the offshore oil and gas sector. This next generation of fire-deluge system, which use synthetic rubber instead of traditional materials such as rigid steel, titanium, copper nickel and glass fibre piping, has now been successfully installed and used in many regions across the globe.

By utilising synthetic rubber, these systems are non-corroding and can withstand jet fires with a heat flux of 390kW/m^2, temperatures above plus 1400°C and flame speeds that exceed the speed of sound. This makes it an ideal material choice for use in deluge and sprinkler systems on offshore oil and gas installations and ships, as well as other hazardous environments.

Due to its flexible characteristics, this new technology can be used to either partly or completely replace old systems and is also an ideal solution for temporary deluge systems when high safety levels need to be maintained during modification work to existing systems.

Meeting Regulation

The United States, specifically the Gulf of Mexico (GoM), has failed to benefit from this innovation, until now. Following extensive testing and review, a recently awarded United States Coast Guard (USCG) approval means that corrosion-free, rubber-based solutions are now qualified for use.

So, the approval of new, corrosion-free, rubber-based solutions could mean a wealth of new opportunities for the GoM. With an estimated 3,858 active platforms and a total of 98 different companies with listed assets that utilise fire deluge systems in the area, the USCG approval of an alternative offshore piping system will allow operators working in the area to easily and quickly increase offshore safety and provide peace of mind for the entire operation.

This is because, as well as offering exceptional performance, rubber-based alternatives are extremely flexible and can be moved and reused (if temporary). Compared with rigid pipe systems, they require fewer construction drawings, and the need for accurate measurements is reduced as the system can be designed and modified on site. Furthermore, systems are installed using no hot work (welding or sparks) that typically shut a platform down while these modifications are taking place.

Dated Infrastructure

The importance of innovative new rubber-based solutions gaining USCG approval is further demonstrated by the high number of aging platforms that currently reside in the GoM and may be in need of upgrading in order to meet the new, extended lifetime of projects. Roughly half of the region's oil and gas production platforms, which is more than 3,000, have been operating longer than their designers intended, with roughly a third dating back to the 1970s or earlier, long before development of modern construction standards.

Worryingly, this has a significant effect on safety as equipment could be severely degraded or corroded after so many years of use. This means that older structures could be more prone to accidents, especially fires and, as such, are much more dangerous for workers; platforms, which are subjected to extreme ocean currents, corrosive salt water and frequent hurricanes, are not mobile and cannot simply be brought back to shore for repairs.

A Proven Solution

As a result of both customer and industry feedback, there are now piping systems available to the industry which are designed for use as deluge and sprinkler systems, especially in harsh environments. The design incorporates three core layers: the fire shield, pressure liner and inner layer.

These combine to give the system high tolerance to impact, jet fire (plus 1400°C for one hour), explosion and water hammer, as well as being lightweight, durable and easy to cut, fit and install.

Compared with a conventional carbon steel based deluge system, which requires more frequent testing and maintenance, and needs replacing at regular intervals over the lifetime of the platform or vessel, rubber deluge systems deliver a very low total life cost. The flexible piping system offers a 30-year minimum maintenance life, and its corrosion-free performance means system testing frequency can be reduced to statutory requirements.

Passive Fire Protection

In addition to fire deluge systems, other fire-stop solutions are available in a series of materials and products to protect personnel, equipment, critical components and structures, and to assist emergency response activity by buying time to gain control of the fire, and evacuate the area. With proven engineering and manufacturing techniques for protection of all kind of fires, from simple cellulose, via HC- and jet fires to protection by missile launching, the rubber materials are built-up of layers and meet protection requirements for corrosion, thermal, fire and mechanical, to protect structures from exceeding temperature limits.

It is key that any fire protection specified for use on an offshore facility provides the following:

- **Stability:** The structure shall fulfil its load-bearing capacity throughout the fire exposure period.
- **Integrity:** Partitions shall prevent spread of flames and hot fumes throughout the fire exposure period.
- **Insulation:** The unexposed side of partitions shall not reach surface temperature in excess of a certain level throughout the fire exposure period. The allowable/critical temperature on the surface of a component is project specific information, with typical values of max 200°C to 400°C.
- **HSE:** Low generation of smoke and non-toxic fumes.

Conclusion

Safety on offshore oil and gas installations is of paramount importance, and having an effective and reliable deluge and fire-stop system is vital to ensuring on-board safety. In the harsh offshore and onshore oil and gas industry, operators need the assurance of a material that delivers proven performance for their critical firewater and utility piping installations, without fail.

So, as new high performance and reliable solutions are developed, the onus is on leading manufacturers to ensure their solutions are tested and audited to meet the varying and necessary regulations of the different offshore regions in which they operate. However, with the high number of aging platforms and rigs currently in operation in the GoM, and the threat of critical failure looming, this is one area in particular where benefits from new technologies and innovations will help bring them back to life and ultimately reduce fire risks and potential downtime or closure.

As such, it has never been more important for leading manufacturers to ensure their products meet the highest standards, especially if they are to guarantee that offshore operators have access to the latest and most innovative solutions which will significantly improve on-board safety and provide peace of mind to all those on board. IFP

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Airport Design & A Systems

Pic courtesy
Graham Collins

Lee Coates

Wrightstyle

Kenya has been much in the news recently, and not for the right reasons. The Westgate shopping mall massacre in which at least 67 people died is a shocking reminder that any building where large numbers of people gather can be a terrorist target.

That threat is most real at airports, which can have a pivotal role in regional or national economies and, for the terrorists, significant news value. Airports have therefore seen the greatest investment in security and building research, although the recent Westgate attack is a reminder that the threat is much wider. Nor is the threat confined to larger hub airports. The 2007 attack at Glasgow airport underlines how terrorism can be either national or local, meticulously planned for maximum effect or simply opportunistic.

But it would be simplistic to consider airport security purely in terms of terrorist threat. In August, Kenya was again in the world's media spotlight following a major fire at Nairobi's Jomo Kenyatta airport, the busiest in East Africa, and of major economic importance for the country – both for inward tourism and exports, mainly cut flowers.

The catastrophic fire, most probably started by faulty wiring, demonstrates how a major infrastructure asset can quickly become a national liability. The airport, built in an age before modern fire regulations and protective systems, was extensively damaged – the blaze gutted the arrivals terminal – closing off a vital transport gateway. However, perhaps remarkably, there were no casualties.

The Nairobi fire is a stark reminder of the importance of identifying every conceivable threat, that strategies to deal with them are robustly examined, and emergency procedures routinely tested – which was not the case in Nairobi with its aged infrastructure, inadequate emergency equipment and poor response planning.

Countering these threats starts with a comprehensive assessment of the likely (or unlikely) risks the airport might face in terms of an accidental or deliberate interruption to its operations. Modern building safety is largely determined by taking a multi-disciplinary approach to assessing these hazards – from power failure to cyber-attack, from civil disorder to fire and explosive detonation.

For an airport, other factors might have to be considered – from the kinds of threat specific to that country or region, to the airlines that make use of the facility. The fact is that, while terrorism is often a blunt instrument involving random carnage, it can also be targeted more specifically.

There are a number of assessment methodologies to understand the potential threats, identify the assets to be protected, and how best to mitigate against those risks. That assessment then guides the design team in determining acceptable risks and the cost-effectiveness of the measures proposed, both airside and landside.

The UK has been at the forefront of airport safety, largely because of the historical threats

dvanced Glazing

Pic courtesy Graham Collins

posed by Irish republican terrorists, which included mortar bombs being fired onto the runway at London Heathrow in 1994. They failed to detonate, but underlined how airport security is an issue that has to be considered outside, not just inside, the airport's perimeter fence.

That, in essence, is the airport designer's conundrum: how to build a facility able to safely handle large numbers of people, while making their experience as hassle-free as possible. Since 1996, the UK's Department for Transport has published guidance in the form of Aviation Security in Airport Development (ASIAD). The guidance covers many of an airport's critical functions, from security checks on passengers to aircraft hold baggage, from the location of car parks to the glazed elements in the building's design.

The guidance also now includes the design of areas immediately outside terminal buildings to create an exclusion zone for unauthorized vehicles. Stand-off distance is an important consideration. A bomb detonating at seven-metres from the terminal façade will, depending on the size of the bomb and type of explosive, generate blast pressure of up to one ton per square foot. At 30 metres, blast pressure falls to one-tenth of a ton per square foot – within building regulation parameters on structural integrity.

Modern building design, in airports as elsewhere, now makes extensive use of glass. It brings in ambient light and creates a more pleasant interior environment. (Interestingly, a *Which* survey earlier this year found that London Luton airport has the lowest passenger satisfaction of any UK airport – a facility that many considered gloomy, and which is one of the oldest terminals in the UK).

The extensive use of glass has come about as a result of investment in innovation, both to develop new laminated glass types and framing systems able to withstand blast pressure, as well as to accurately evaluate those systems using a variety of assessment and computational tools.

Wrightstyle has gone beyond computational assessment to also conduct live bomb testing. One test involved a simulated lorry bomb attack (500 kilograms of TNT-equivalent explosive) detonated 75 metres from the test rig, followed by a simulated car bomb attack on the same glazing system (100 kilograms of explosive), detonated at a distance of 20 metres. Both tests were equally successful.

Our compatible systems, with the glass and steel framing systems tested together, are accredited to EU, US and Asia Pacific standards, and our strong advice is to always specify the glass and framing as one unit: in a real fire or terrorist situation, the glass will only be as protective as its frame, and vice versa.

As recent events in Kenya have shown, both fire and terrorist attack are potent threats to be assessed, comprehensively guarded against, and with regular rehearsals to ensure that response teams can deal adequately with any emergency.

That multi-dimensional approach also extends across the built environment, developing next-generation products and systems to ensure new levels of fire and terrorist protection. The specialist glass and glazing industry remains at the forefront of that innovative research process. IFP

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Fixed Firefighting Systems in Road Tunnels

SP Technical Research Institute of Sweden was recently commissioned by the Swedish Transport Administration (STA) to conduct six experiments in which a fixed firefighting system (FFFS) was stress tested under different fire conditions in a test tunnel. The system is designed to be used in road tunnels in the Stockholm Bypass. The Stockholm Bypass is a new highway connection proposed to cut through western Stockholm.

A large part of the road system, 18 km one way and in total about 50 kilometres, will pass through tunnels and it is very important that adequate fire protection is in place. The projected number of vehicles using the tunnel is large. Forecasts show that up to 145,000 vehicles a day may pass through the Stockholm Bypass. This traffic density requires special fire safety measures as the tunnel will be a critical transportation infrastructure for the region and any type of disturbance in the traffic flow has the potential to cause major problems in the future. This number of vehicles indicates that the risk of congestion in the tunnel is high, and so there is a significant risk of fire. Therefore, the STA has decided to test a new safety concept using sprinkler technology with large droplet side-wall sprinkler nozzles mounted on a single pipe in the ceiling. Given that this new technology for FFFS is key to the safety of modern STA urban road tunnels, it is very important that the function is properly verified through large-scale testing.

The FFFS concept was developed by the STA together with the fire consultant company Brandskyddslaget and in collaboration with SP. It is a simple and robust system that is relatively inexpensive. The purpose of the tests was two-fold: to investigate how the activation time of the FFFS system affects their efficiency in attacking a fire in a truck trailer loaded with wood pallets; and to determine the longest activation time that would keep the fire under control.

When a fire is detected by surveillance cameras (CCTV) or other detection systems, some time is

required before a decision is made to activate a 50-metre long FFFS section in the vicinity of the fire. The section where the fire occurs is wetted with ten millimetre minimum water density once activation has been initiated. The system consists of a pipe positioned in the middle of the tunnel ceiling, with a nozzle pair every five meters that sprays 375 litres-a-minute water horizontally in two directions, in total 750 litres-a-minute. Each nozzle throws out as much water as a firefighter with a traditional firefighting hose. One could imagine that there are 20 firefighters every 50 meters fighting the fire, operating a total of 7500 litres-a-minute of water. The water supply for the fire brigade will be integrated into the same water supply system as the FFFS. The uniqueness of the system is its simplicity and the fact that large droplets are thrown towards each tunnel wall. Investment and maintenance costs are estimated to be approximately 50 percent of a traditional deluge system.

Prior to the tests that where performed in the Runehamar tunnel in mid-September 2013, some preparatory tests of the spray pattern, droplet distribution and throwing length were carried out in the fire laboratory at SP. These tests were necessary as input to the planning of the large scale tests. One issue in the planning related to the fact that the Runehamar tunnel is only 9 metres wide, whereas the Stockholm Bypass tunnel will be on average 15 metres wide. Ultimately it was determined that only one side of the system would be tested, that is, the main pipe was mounted close to a side wall of the tunnel instead of the centre with one nozzle directed towards the fuel that was placed in the centre of the tunnel.

This was a reasonable choice, as the system was designed to be symmetrical and the tunnel contains several lanes implying that a real fire would be expected towards one side of the tunnel. This resulted in a lower total required amount of water for the tests (50 percent relative to a real situation); however, there was a need to further reduce the water use in the tests as the water tank in the test tunnel did not have sufficient capacity for the test duration at full delivery rate. Therefore, it was decided to reduce the total length of the operating zone from 50 metres to 30 metres with a corresponding reduction in the water flow rate requirement. In order to investigate the influence of these deviations, the system was first tested in a model scale tunnel, at 1:4 scale. In the 1:4 scale tests it was possible to study the influence of these changes. It was found that these changes lead to conservative results. The nozzles themselves were scaled by scanning the original sized nozzle and using a 3D printer technique to "print" a 1:4 scale version of the nozzle in steel.

There are many parameters that can affect the outcome, such as water density in mm/min, droplet size, activation time, longitudinal ventilation velocity, fuel configuration and fuel size. Modern design fires for ventilation systems are often set to 100 MW, but if an FFFS is installed this can potentially be reduced to 50 MW, depending on the system used and the fire scenario. This lower heat release rate in turn affects the design of the ventilation system, making it perhaps possible to work with a smaller fan capacity, which in turn affects the total investment cost.

This was also one of the reasons the STA was interested in exploring the effect of the system on the fire size. Another consequence is that the gas temperature in the ceiling near the fire may be

The fixed firefighting system concept to increase safety in tunnels was developed by the Swedish Transport Administration together with the fire consultant company Brandskyddslaget and in collaboration with SP Technical Research Institute of Sweden. It is a simple and robust system that is relatively inexpensive.

reduced from 1300°C to lower than 800°C, which requires less protection for the tunnel structure. In order to fully realise the benefit of a lower design fire in a tunnel with a FFFS, the reliability of the systems has to be addressed. This is a complex issue that cannot be fully answered in this article.

The fire tests conducted used a test fuel comprised of 420 wooden pallets placed in the centre of the tunnel. This test fuel mock-up is often used to simulate the pay load of a truck. This fuel load was designed to produce a heat release rate at about 100 MWs if no FFFS is present. The Runehamar test tunnel length is 1650 metres and is covered with shotcrete at selected locations to withstand a fire. The tests were conducted approximately 600 metres from one portal of the tunnel. The ventilation in the tunnel was controlled by jet fans, which could maintain an air velocity of three metres-a-second, that is the same design velocity used in the tunnels in Stockholm to control the smoke. The fire source was covered with steel plates on both the front and back, and above the pallets. This arrangement makes it difficult for water to penetrate directly into the pallets, which increases the severity of the test by reducing the ability of the system to fight the fire.

The pallets were ignited just behind the front plate, and gas temperatures, heat release rates, visibility, gas concentrations, and water flows and pressures, were registered. The heat release rate in MW was measured by measuring the gas and air flows further away from the fire. To mimic a real situation, the detection temperature was set at 141°C and time from detection to activation was set in advance at two minutes for the initial test, with an additional time for each test until the system was no longer able to keep the fire under control. The additional times were four minutes and eight minutes, respectively, for the second and third tests.

In addition to these tests, a test in which a tarpaulin was placed on the sides of the fire load to simulate a covered cargo, and a test in which the front cover was removed so wind could help fire spreading forward in the pallet stacks, was conducted. In these tests the fire was allowed to grow up to 141°C plus four minutes before the water was turned on. In the final test, the system was activated after 12 minutes, but due technical failure in one of the main pipes the water was not delivered onto the fire source.

The heat release rate upon activation ranged from approximately ten MW to 30 MW, which was seen to decrease significantly within a period of ten to 20 minutes in all cases. Preliminary analysis shows that the FFFS resulted in lower heat release rates than 50 MW in all cases, which was one of the original questions postulated by the STA and now answered by the experimental data. The maximum temperatures at the ceiling were never higher than 400°C to 800°C after activation. In all experiments the fire was controlled in the first period after activation and then suppressed with considerable fuel still remaining. A pile of pallets stood five metres from one end of the fire. It was used to assess the risk of fire spread to adjacent vehicles. In all cases with FFFS operating, the target was unaffected by the main fire.

The experiments show the importance of early activation of the FFFS. Despite this it was clear from the experiments that the system has a sufficient safety margin to allow delayed response while retaining the ability to fight the more severe fires produced by such a delay. The system was able to prevent the spread of the fire beyond the main fire load, and was clearly able to lower the gas temperatures in the tunnel. This has important implications for the design and safety of the evacuation.

The 1650-metre test tunnel is covered with shotcrete at selected locations to withstand a fire. The tests were conducted approximately 600 metres from one portal of the tunnel and ventilation was controlled by jet fans to maintain an air velocity of three metres-a-second.

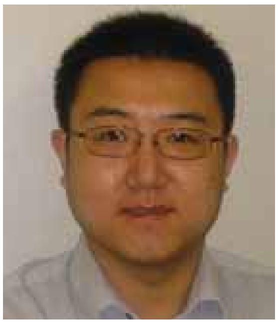
The tests show that the design fire of 100 MW as originally planned can be reduced to lower than 50 MW by the presence of a FFFS, which translates into huge savings in investment costs for the ventilation system. The experiments show that if the system activates late, an increase of toxic substances and smoke is produced, but the impact of this effect is easily mitigated by activating the system early. Further research is needed to investigate the implication of this observation in future testing.

The benefits of FFFS are primarily that they can be used to increase safety in tunnels. Such systems will be able to fight fires that are relatively large and thereby potentially prevent a major disaster. In the case of congestion and specifically when a queue is formed, the system will increase safety by minimising the risk of propagation of a fire should it occur. IFP

Haukur Ingason and **Glenn Appel** are researchers at SP Technical Research Institute of Sweden

For further information, go to www.sp.se

Construction Stee Future Challenges



Jifeng Yuan

Exova Warringtonfire

The need to ensure effective fire protection in the structural steelwork of buildings has never been greater. So, what are the key issues and what is the crucial role of testing and certification?

Fire protection is an important life safety issue, demanding sharp focus on detail at every stage of a product's life cycle. This means fire safety products must undergo a wide range of rigorous testing, which includes fire performance to prescribed fire curves, environmental and compatibility testing.

Current Building Regulations in the UK require buildings to be designed and constructed so 'stability will be maintained for a reasonable period' during a fire, providing time for the occupants to escape and emergency services to respond. Effective design principles should be shared globally, underpinning local regulations as well as international building codes, whose implementation is crucial to the design and construction of a building.

The fire safety strategy will reflect building codes and/or design standards and consequently contain functional requirements for construction materials – fire performance generally includes fire resistance, reaction to fire and fire toxicity. In the UK, fire tests on elements of building construction can be carried out in accordance with a number of British and European test methods. The BS 476 series is used in the UK and many other countries where British Standards are traditionally used. However, it is being superseded by European fire testing standards intended to remove technical barriers and create the European single market. Recognition of these standards is given in Approved Document B: 2006.

New Regulations Bring Fresh Challenges

The need for products that are professionally and comprehensively tested is underscored by new regulations that mean the construction industry is facing its most significant changes for a decade in relation to the sale of construction products in Europe. Since July 2013 the Construction Products Regulation (CPR) stipulates that manufacturers must draw up a declaration of performance and apply CE marking to any of their construction products that are covered by a harmonised European standard (hEN), or which conform to a European Technical Assessment (ETA).

Leading manufacturers also work with reputable independent third-party organisations on voluntary verification and assessment of their product's

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performance in order to gain higher market confidence. Voluntary marks provide added value, such as covering a new characteristic not dealt with in the standard, or at a higher level. However, voluntary marks cannot be used to establish the legal requirements covered by CE marking, or to demonstrate compliance.

Effective Fire Protection Testing for Structural Steelwork

Fire protection to structural steel work is a good example of how this testing and certification process works. Steel works are increasingly popular in most modern buildings as a loadbearing framework. As a result it is essential to protect the steel structure from fire so that the frame retains sufficient strength to sustain its loadbearing function.

A wide range of materials is available to enhance the fire resistance of structural steel members. Traditionally non-combustible boards and cementitious sprays were applied to the frame on-site. These materials are still commonly used, usually where the frame is largely hidden, or it is in a harsh environment. However, in recent years reactive coatings – known as intumescent paints – have become increasingly popular as they have good aesthetic properties and can be more versatile in application. Whatever type of fire protection is used, it is evaluated by testing a variety of individual structural members in special 'fire resistance' furnaces.

In Europe, particular procedures for assessing fire protection on steel structures are currently specified in EN13381 series (for example parts 4 and 8). In the UK, the general procedures used for determining the fire protection on steel structure are specified in the ASFP Yellow Book and BS476 series. The British standards will gradually be replaced by the European standards as manufacturers seek to export products to mainland Europe and develop new products to meet the superior European standards. However, the need for the British standard remains for products that do not have to be CE marked and for markets outside Europe currently using British standards.

The Importance of Accuracy in the Process

Assessment of fire protection for structural steels generally involves two parts. Firstly, a carefully designed programme of fire tests is carried out on both loaded and unloaded specimens and secondly, a mathematical/statistical or other procedure is applied to the results of the tests to facilitate predictions of required thickness.

These programmes of tests are designed to determine both the insulation characteristics of a fire protection material and its physical performance under fire conditions for a range of steel sizes (in terms of section factor, protection thicknesses and fire resistance periods). In some cases the general assessment should be used in conjunction with specialist design information. For example, the protection coating on cellular beams should be determined by a web post line assessment, elemental multi-temperature analysis as well as a limiting temperature assessment by a competent structural fire engineer.

The assessments will be primarily based on test information from third-party test laboratories accredited to EN ISO 17025 such as UKAS-accredited laboratories or other laboratories similarly accredited by national bodies.

Installation and Fire Risk Assessment

Building owners and occupiers have questioned the adequacy of fire protection in existing buildings and buildings currently under construction under the UK's Regulatory Reform (Fire Safety) Order.

Discussions between the UK government and the stakeholder community have resulted in a guide to the required competence of fire risk assessors. Published in 2011, the guide aims to ensure the competence of certification bodies so the spread of fire and smoke is restricted and lives are not at risk due to deficient fire protection.

The debate surrounding these developments has highlighted potential risks of improper installation and promoted inspection, while putting contractors and installers of fire protection in buildings under scrutiny. Passive fire protection should be fit for purpose, properly installed and maintained in accordance with the manufacturer's instructions or a relevant standard. Fire risk assessors should look for certificates of completion by contractors in the Construction Design and Management Regulations 2007 (CDM) safety plan, or in Regulation 38 information (England and Wales).

Independent third-party certification schemes for such products and installers are an effective means of providing the fullest possible assurances, offering a level of quality, reliability and safety that non-certificated products may lack. For the purposes of a fire risk assessment under UK legislation, the main aim is to minimise the likelihood of a fire and allowing occupants to escape if a fire occurs. Professional fire risk assessors must be demonstrably competent because criminal liability arises for the 'responsible person' if the fire risks assessment is inadequate and people are placed at risk. The responsible person must also put in place a system for ensuring the integrity of any fire protection measures is not compromised when alterations are carried out to the building.

Installation of Intumescent Paint – A Specialist Field

Intumescent paints are highly specialised products, both in terms of their performance and the crucial significance of correct application. As a result, they must be applied by specialist contractors who know and understand the practicalities of coating application, as well as the importance of attention to detail in the installation process. This requirement is reflected in the statement from Approved Document B (UK): 'Since the fire performance of a product, component or structure is dependent on satisfactory site installation and maintenance, independent schemes of certification and registration of installers and maintenance firms of such will provide confidence in the appropriate standard of workmanship being provided.'

A large number of factors can affect the in-service performance of the reactive coating system, and must therefore be considered throughout the application and service life of the coating. Generally, steel erected on site will already be blasted and primed, but if not, the specification may need to include blasting standards and procedures, and criteria for primer selection. Steel surfaces should be prepared by removing scale and rust using abrasive blasting to a minimum standard of Sa2½ as defined in BS EN ISO 8501-1: 2001.

Factors Affecting the Performance of Protective Coatings

The nature of the environment to which the coatings will be exposed may affect their durability or performance in a fire situation, and may also affect any primer, along with the type and thickness of top coat. Before the application of the intumescent basecoat, the installer/applicator must ensure that the primer, intumescent basecoat and top coat are compatible in both ambient and fire conditions.

The need to completely remove and reinstate the intumescent coating system at any stage in the life of a building would involve considerable cost and disruption, so the fire protection should be specified and installed in a way that lasts for the design life of the building. The specifier should take into account the ease of maintenance of the fire protection system.

Key Legal Considerations

Whether or not the specifier, designer or contractor is the 'responsible person' under the UK Regulatory Reform (Fire Safety) Order 2005, it is prudent that measures to ensure regulatory compliance are built into every contract at the design and specification stages.

Detailed and accurate records are important for any coating contract, but for fire protection projects they are an essential contract requirement. Evidence of compliance with the specification will often rely on the existence of a detailed and accurate dossier of information and records. This is because the work can extend over a long period of time, several locations and possibly more than one product supplier and sub-contractor. Such records will also be necessary to demonstrate compliance with statutory requirements.

However, the mere existence of records may be insufficient to provide complete confidence that the work has been carried out to the required standards, so wherever possible key stages in the installation process should be witnessed by an independent quality assurance representative or third-party.

The Effectiveness of Teamwork

Professional specialists who have completed a fire investigation, appreciate the logic that fire safety precautions can never be cautious enough. It is increasingly understood nowadays that a balanced approach must be adopted for sustainability, safety, economics and environmental issues.

Where fire safety is concerned, a close team of competent fire safety design engineers, product test/assessment specialists, certification authorities, installers and fire risk assessors is essential to minimise the fire risk and warrant a 'compete building approval' with high level of confidence. IFP

Dr Jifeng Yuan is senior certification engineer at Exova Warringtonfire

For further information, go to www.exova.com

Monitoring Fixed Suppression Syst

Carl Hunter

Coltraco

One of the key challenges facing business currently is business continuity, particularly in high asset and hazardous environments. With the growth in awareness on this particular subject over the last ten years or so, one thing has become apparent, namely that many fixed suppression systems globally have suffered from accidental discharge or slow seepage. Often this occurs without the knowledge of the business owner. Many business owners will only have their fixed suppression system checked once a year in order to meet their safety criteria.

Historically, the checking of a fixed fire suppression system involved shutting the system down and weighing each individual cylinder using scales. Ten years ago Coltraco developed the Permalevel Single Point single point system for the UK's Atomic Energy Authority, building on its development 20 years ago of a portable liquid level indicator called Portalevel. This system was designed to allow the monitoring of up to five individual fire suppression cylinders monitoring the applications on a 24/7 basis. This system was first used by the US Navy & Royal Navy, which are two of the most safety aware organisations on the planet.

One of the key challenges that has faced the fire suppression industry over the last few years has been the growth in size of facilities such as data centres. If a data centre for an organisation such as Google was to be damaged by fire, it would affect not only Google but also the millions of people who use it on a daily basis. This industry along with the oil and gas industry, which is particularly safety conscious, and high rise buildings in Dubai has driven the development of the Permalevel Multiplex system.

As we have seen, one of the main challenges facing the industry is how to keep both high-rise residential buildings safe and industry running in ever more challenging environments. Therefore how can we overcome those challenges?

The Permalevel Multiplex system is designed to provide 24/7 monitoring of anything from five to 700 cylinder level points. One of the key drivers during development came from Dubai. There were concerns with regard to some of the high-rise tower blocks, and the integrity of their fire suppression systems was questioned due to a number of fires occurring in these developments. From talking to the developers of these tower blocks the aim therefore became to develop a system whereby enough modules could be produced and networked in order to monitor 700 cylinders.

This is the first fixed system worldwide that is capable of monitoring the liquid level of critical fire suppression systems that use liquid suppressant agents such as FM200, Novec 1230 and CO_2 on a constant basis. The equipment is also rated to withstand temperatures of 70°C and relative humidity of 95 percent. This makes it particularly

Gaseous
ems

suited to the type of industries such as data centres, offshore oil and gas platforms and drilling ships, high rise buildings, shipping and power generating facilities. These high-value high risk industries, where a fire would have a major detrimental impact on the day-to-day running of their business, recognise the added safety value that comes from being able to monitor the contents of their fire suppression systems 24/7. The system is designed to ensure that fire suppression systems are always fully operational with no accidental discharge ensuring business continuity for companies who operate in these environments.

Due to the sophistication of the system, for example with an RS232/485 computer interface it allows a computer operator in the control room to call up cylinder numbers 21 and 623 to check what the live levels actually are. With this level of awareness it was necessary to add a complex data logging system in order to record on a 24/7 basis. The Multiplex system is designed to be user friendly so that the on-site maintenance team can quickly identify and rectify any issues. As an example of this, each module has a set of green and red LED lights that act as a local display and allow the maintenance team to go into a room and identify which cylinders have issues quickly and easily.

One of the key development issues that had to be overcome was how to mount the sensors in such a way that they will not be dislodged by somebody walking past. Once achieved, it was then possible to guarantee a maintenance program to ensure those sensors are working properly. It was obviously essential to work closely with the in-house maintenance team to ensure that a maintenance program was put together they could understand and implement.

The system is designed to be as user friendly as possible, and accuracy is a major driver. The Multiplex system has industry leading accuracy figures of +/–1.5mm, which helps to ensure that facilities are protected and safe.

Historically, downtime when performing maintenance checks on a system was an issue particularly in high risk environments such as offshore oil & gas because of the risks involved in shutting the system down. With Coltraco's equipment an otherwise 30-minute to 60-minute job of dismantling, weighing and re-installing a cylinder takes 30 seconds to 60 seconds with a Portalevel unit , but using Permalevel Multiplex even this aspect is made redundant, as it is monitoring the cylinder 24/7/365.

As an example of the safety risks involved in the maintenance of fixed fire suppression systems, on the 23rd May 2010 the general-purpose oilfield support vessel *Marsol Pride* was conducting underwater operations within the Tui oil and gas field off the west coast of New Zealand. *Marsol Pride* was fitted with a fixed carbon dioxide fire smothering system for its engine room. Late that night a valve on one of the CO_2 pilot cylinders developed a leak and charged the system ready for release. A second leak in the main control valve then caused the entire system to activate resulting in an uncontrolled release of CO_2 gas into the engine room.

An automatic alarm in the engine room had warned the duty engineer of the impending release, so he had left the engine room to investigate the reason for the alarm. The incident caused one of the two main propulsion engines to shut down due to air starvation; other than that there was no damage to the vessel and no one was injured. An uncontrolled or inadvertent activation of an engine room fixed CO_2 gas fire smothering system is a serious event because the CO_2 gas displaces any air in the space so that it cannot sustain human life, and it can immobilise the ship's propulsion and generator systems at a critical part of an operation.

The lessons learned from this incident were: any component in a fixed CO_2 gas fire-fighting installation, the failure of which can cause serious harm or immobilise a vessel, should be inspected and tested often enough to detect any deterioration in performance so that remedial action can be taken to avert a failure; additionally, the conditions under which control valves or any other component in a fixed CO_2 system are tested should be the same as or greater than the normal operating conditions for the system.

A safety recommendation was made to the Director for Maritime New Zealand to forward this report to the International Maritime Organization (IMO) and the International Association of Classification Societies. The aim was so that they could draw on the lessons learned from this incident and consider amending the current guidelines that currently suggest an inspection of control valves only once every five years.

As another example of the risks involved in the maintaining of fixed fire suppression systems, just over a year later in August 2011, a shore-based service engineer was seriously injured while testing components of the tug SD Nimble's fixed carbon dioxide extinguishing system. Six cylinders where accidentally discharged after the tug had slipped her berth at Her Majesty's Naval base in Falsane Scotland. This led to the depletion of oxygen levels in the cylinder room following the accidental discharge. The engineer quickly lost consciousness and the tug was manoeuvred back to her berth so that the engineer could be removed to the open deck where cardio pulmonary resuscitation was started. The engineer was subsequently transferred to hospital where he made a full recovery.

These two separate incidents show the dangers involved in maintaining fixed fire suppression systems. In particular the *Marsol Pride* was compliant with IMO requirements. This illustrates why companies that operate in high risk environments specify Permalevel Multiplex™. Having an automatic monitoring system reduces the risk when maintaining fixed fire suppression systems and makes sure they are monitored more regularly than required by the IMO.

This system allows its users to operate with much less downtime than they would previously have had to factor in, allowing them to optimise profits against downtime and doing so in a safe environment.

This system, as outlined, is aimed at companies that operate in industries that have identified the risks involved in the environments in which they operate and can justify the expenditure of using a system that monitors their fixed fire suppression system 24/7 365 days a year. We believe the industry as a whole needs to move away from the idea that having fire suppression system checked once a year is adequate. That leaves a probability of 364 that the fire suppression system will lose integrity over the course of the year. What we have seen in the past however is that where industries, such as offshore oil and gas lead from a safety perspective other industries follow in time.

We understand that a system such as Permalevel Multiplex is not suitable for everybody, but it can be used to help educate the industry further as to why monitoring and checking a system more frequently than currently required is good for business continuity. It ensures that the fire protection system has full integrity should the worst happen and it is needed to put out a fire.

To conclude, as companies are forced to operate ever further from home and in more challenging environments where help may be two or three days away, it is vitally important to have a fire suppression system that they are confident will be effective. By using a system such as Permalevel Multiplex they are ensuring the integrity of their systems and can have confidence in it if the worst happens and the fire suppression system is needed. By monitoring the system continuously 365 days a year 24/7 it enables workers to have full confidence in their safety and ensures business continuity. Over time, this may be one of the key drivers behind the industry moving forward in terms of the testing and maintenance of fixed fire suppression systems. In an ideal world rather than it being acceptable to have your system checked once a year it will be checked maybe once a quarter. IFP

Carl Hunter is Managing Director and CEO of Coltraco

For further information, go to www.coltraco.co.uk

The Dangers of Ex Fires in Multi-stor

Fire tests can be carried out in purpose built facilities at BRE. This photograph shows a demonstration calibration test

Tony Baker

BRE Global

Although many building products offering lower environmental impacts are combustible, it is still possible to use them in a cladding system by testing the cladding system as a whole.

External cladding fires can have devastating effects on human life, business and property. If a fire in a room on a lower storey of a multi-storey building breaks out of a window or door opening, there is potential for fire to spread quickly up the external cladding system and break back into the building through windows in upper stories.

The same concern applies with an accidental or malicious external fire started in a wheelie or rubbish bin or an area of stored materials. This form of fire spread has the potential to escalate rapidly, potentially bypassing compartmentation within the building, reducing the time or options available for evacuation and the ability to contain the fire.

As well as people in the building, individuals on the ground such as firefighters and evacuating occupants face potential risks from the collapse of a building's cladding system or flaming debris from the system as a result of the fire. The performance of cladding on external walls when exposed to fire is therefore a key concern when assessing risks to people and property.

Such issues, including limiting the spread of fire via external cladding are addressed in Approved

ternal Cladding ey Buildings

Document B (AD B) of the Building Regulations in England and Wales (and similar documents in Scotland and Northern Ireland). AD B guidance states that any product used in the external wall construction (except for gaskets, sealants and similar components) in buildings with a storey 18 metres or more above the ground, must be of limited combustibility. This is because of the increased risks associated with external flame spread on buildings of this size.

It is possible to demonstrate compliance with AD B by testing the cladding system as a whole to BS 8414 (*Fire performance of external cladding systems. Test methods for non-loadbearing external cladding systems applied to the face of a building*), and satisfying the performance criteria set out in the publication, *Fire performance of external thermal insulation for walls of multi-storey buildings* (BR 135) produced by BRE Global.

Many of the current building products with lower environmental impacts are combustible. But as the principle of BS 8414/BR135 is to determine the fire performance of the complete cladding system, it is quite possible to integrate combustible products into a cladding system and achieve good system fire performance in accordance with BR 135 if the system is suitably designed and installed and incorporating appropriate cavity barriers and fire breaks.

The performance-based approach in BR 135 allows building professionals to use new and innovative materials with low environmental impacts whilst maintaining fire safety. The test method in BS 8414 was developed to demonstrate that, under a simulated fire in a compartment breaking out of an opening in the external wall, the cladding system will not permit excessive fire spread up the outside of the building.

Once ignited, the combustion chamber acts like a window with the flames travelling out and up the sample

The temperature, height and speed of flame spread will be taken into account when the results are assessed. Pic courtesy of Graham Collins

The provisions of AD B are focused on life safety. Insurers and building owners may want an enhanced performance specification in order to further reduce the risks to property and business continuity. In these cases it is possible to further assess a cladding system to Loss Prevention Standards, LPS 1581 (for systems applied to a building with a masonry face) and LPS 1582 (for systems applied to and supported by a steel frame). Published by LPCB (Loss Prevention Certification Board), the third-party certification body incorporated into BRE Global, these standards use the test methodology in BS 8414 and were developed in conjunction with the insurance industry. They require a higher level of system performance under fire conditions where the extent of the fire damage is critical in the context of property damage and the continuity of business operations.

Specifiers are increasingly choosing cladding systems that are properly tested, installed and maintained. Independent third-party certification of external insulated cladding systems can increase the confidence in the performance of the systems, further reducing the risks to businesses and property. IFP

'Fire performance of external cladding systems – Part 1'. BRE 135 (third edition) is available from www.brebookshop.com, while all LPCB approved products and standards are listed in The Red Book and online at www.RedBookLive.com

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For further information, go to www.bre.co.uk

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